

# A REVISION OF THE GENUS *DUCETIA* STÅL (ORTHOPTERA : TETTIGONIIDAE)

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## SYNOPSIS

The genus *Ducetia* Stål is fully revised. Five generic and five specific synonyms are newly established, and nine new species are described. The status of *Noia testacea* Walker is discussed.

## INTRODUCTION

IN addition to those which have been described in *Ducetia* Stål and *Noia* Walker, this revision covers all the species, with the exception of *Isotima japonica* Matsumura & Shiraki, which have been described in the genera *Isotima* Brunner, *Paura* Karsch, *Pseudisotima* Schulthess, *Kuwayamaea* Matsumura & Shiraki, and *Telaea* Bolivar. These five generic names are here newly synonymized: the first (together with *Isotimula* Uvarov) with *Noia* Walker, and the remainder with *Ducetia* Stål. *Isotima japonica* Matsumura & Shiraki was placed by Bei-Bienko (1954) in the genus *Anisotima* Bei-Bienko. Its wing-venation, though reduced, does not suggest any connection with *Ducetia* Stål, and, both because of this and to avoid the homonymy which would result from the inclusion of this species in *Ducetia* Stål, I have excluded it from this revision.

The genus *Ducetia* was erected by Stål in 1874 for the single species *Locusta japonica* Thunberg, 1815. In 1878 Brunner added three further species: *D. adspersa* Brunner (based on a rather aberrant specimen of *D. japonica* (Thunberg) (see p. 182)), *D. ceylanica* Brunner, and *D. punctipennis* (Gerstaecker). With the addition of this last species, described from Kenya, the genus was recognized as extending beyond the Orient into the Ethiopian Region. At the same time Brunner published a preliminary description of *chinensis*, placing it in his new genus *Isotima*. Although the holotype of this species, which was stated by Brunner to be in Budapest, is almost certainly now destroyed, there can be little doubt as to which species is

involved, and there seems to be no taxonomic feature to justify placing it in a separate genus.

Ten years later Karsch (1888) erected the genus *Paura* for two new species *P. biramosa* Karsch and *P. reticulosa* Karsch. These species were each based on a unique female specimen, and the holotypes have proved to be females of two sexually dimorphic African species of *Ducetia* Stål, one of them already known from the male as *D. punctipennis* (Gerstaecker). This situation is discussed more fully on p. 202.

In 1891 Brunner added *D. cruciata* and at the same time described *Isotima javanica*. This latter species is without doubt congeneric with *D. japonica* (Thunberg), from which it is a brachypterous derivative. The African species *Pseudisotima punctata* Schulthess, 1898, is a similar case, being derived by reduction of the wings from *D. punctipennis* (Gerstaecker); here again a separate genus is quite unwarranted. Two further African species have been described since this time: *D. loosi* Griffini, 1908 and *D. fuscopunctata* Chopard, 1954.

Bolivar erected the genus *Telaea* in 1922 for the species *T. quadripunctata* Bolivar. The holotype of this species was found close to the type locality of *D. punctipennis* (Gerstaecker), and the type specimens of these two species are undoubtedly conspecific.

The genus *Noia* Walker, erected in 1870 for the brachypterous species *N. testacea* Walker, presents something of a problem. It agrees with *Ducetia* Stål in every feature of taxonomic importance, but unlike the two brachypterous species of that genus it shows no close affinities with any macropterous species. Unfortunately, *Noia* Walker has priority over *Ducetia* Stål; if it were not for this I should have little hesitation in regarding *testacea* as a third, though rather aberrant, brachypterous species of *Ducetia* Stål. However, it would be most undesirable to replace such a well-known name as *Ducetia* Stål by a name which has barely appeared in the literature since its creation in 1870. For reasons mainly of convenience I am therefore giving *Noia* Walker separate generic status in this revision. When our knowledge of the group is in a more advanced state, it may be advisable to apply to the International Commission on Zoological Nomenclature for the suppression of the name *Noia* Walker in favour of *Ducetia* Stål. In this revision *Noia testacea* Walker is included in the key to the species of *Ducetia* Stål. The generic name *Isotima* Brunner (together with the nom. n. *Isotimula* Uvarov) is here synonymized with *Noia* Walker, on the ground that the holotypes of the respective type species are conspecific.

In this revision nine new species are described, bringing the total number of species in *Ducetia* Stål to twenty. Five generic and five specific synonyms are newly established. Access was gained to all the existing type specimens, including those representing synonyms, except for one in Japan and one in Genoa.

#### ACKNOWLEDGMENTS

My most sincere gratitude is due to the following specialists who have spared time and energy to send me type specimens or other material from their respective museums:

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I am also most grateful to the following workers, who have been kind enough to send me specimens which they have collected personally :

Dr. S. Asahina, Mr. E. S. Brown, and Mr. and Mrs. R. W. Crosskey.

Finally I wish to thank Miss P. M. Stock for her practical assistance.

#### MATERIAL

In addition to the collection of *Ducetia* Stål in the British Museum (Natural History) material was lent by the sources listed below, through the courtesy of the specialists mentioned above.

Musée Royal du Congo Belge, Tervuren ; Naturhistorisches Museum, Vienna ; Muséum National d'Histoire Naturelle, Paris ; Institut Royal des Sciences Naturelles de Belgique, Brussels ; Rijksmuseum van Natuurlijke Historie, Leiden ; Zoologische Museum of the Humboldt-Universität, Berlin ; South Australian Museum, Adelaide ; South African Museum, Cape Town ; Universitetets Zoologiska Institution, Lund ; Zoological Institute of the Academy of Sciences of the U.S.S.R., Leningrad ; Academy of Natural Sciences of Philadelphia ; Institut Français d'Afrique Noire, Dakar, Senegal.

#### *DUCETIA* Stål, 1874

*Ducetia* Stål, 1874, *Recensio Orthopterorum*, 2 : 11. Type species, by monotypy, *Locusta japonica* Thunberg, 1815.

*Paura* Karsch, 1888, *Berl. ent. Z.* 32 : 439. Type species, by subsequent designation (Kirby, 1906, p. 407), *Paura biramosa* Karsch, 1888. **Syn. n.**

*Pseudisotima* Schulthess, 1898, *Ann. Mus. Stor. nat. Genova*, 39 : 199. Type species, by monotypy, *Pseudisotima punctata* Schulthess, 1898. **Syn. n.**

*Kuwayamaea* Matsumura & Shiraki, 1908, *J. Coll. Agric. Tokyo*, 3 : 7. Type species, by original designation, *Kuwayamaea sapporensis* Matsumura & Shiraki, 1908. **Syn. n.**

*Telaea* Bolivar, 1922, *Voy. M. Rothschild E. Afr. Anim. Art.* 1 : 201. Type species, by monotypy, *Telaea quadripunctata* Bolivar, 1922. **Syn. n.**

DIAGNOSIS. ♂♀. Radius of fore wings almost always with pectinately arranged posterior branches (except in brachypterous species), usually three or more in number and often closely parallel to each other. Pronotum without lateral carinae ; lateral pronotal lobes with more or less distinct angle in antero-ventral region of margin. Fastigium of vertex compressed, sulcate above. Fore tibiae with oval tympanic opening on both sides. Fore coxal spine very small or absent.

DISCUSSION. The species of this genus show a general tendency to have a comparatively large number of pectinate branches on the radius of the fore wing. This feature reaches its fullest expression in such species as *D. japonica* (Thunberg), *D. loosi* Griffini, *D. costata* sp. n., and *D. ramulosa* sp. n. In several of the African species these branches tend to be arranged rather irregularly, so that the pectinate pattern sometimes becomes obscured ; examples of this are shown by *D. crosskeyi* sp. n. and *D. chelocerca* sp. n. In *D. chinensis* (Brunner), which has somewhat



reduced wings, there are too few radial branches in the fore wings to show clearly their pectinate arrangement, and in the brachypterous species *D. javanica* (Brunner) and *D. punctata* (Schulthess) the pectinate pattern is quite lost. In *D. furcata* sp. n. the radius presents a complete departure from the arrangement typical of the genus in having a bifurcate sector.

In the oriental species the venational feature mentioned above, when shown by the male, is shown in exactly the same way by the female. In fact, apart from the usual differences in the genitalia and stridulatory organ, the sexes are closely similar. This is also true of the two African species *D. loosi* Griffini and *D. fuscopunctata* Chopard, and in the very brachypterous species *D. punctata* (Schulthess) the sexes again resemble each other quite closely. However, the females of *D. punctipennis* (Gerstaecker) and *D. biramosa* (Karsch) are markedly different from the males: they have no hind wings and the venation of the fore wings is too reduced for there to be more than a suggestion of a pectinate arrangement in the radial branches. In the remaining eight African species the female sex still remains to be found and the extent to which sexual dimorphism is shown by each of them must remain unknown for the present. It would of course be most interesting to know whether the females of any of these species show intermediate stages in sexual dimorphism between the normal condition (as found in *D. loosi* Griffini, for example) and the extreme cases mentioned above.

It is possible to trace certain evolutionary trends within the genus, and I have attempted to represent these diagrammatically in Text-fig. 1. The species *japonica*, *furcata*, *cruciata*, and *ceylanica*, form a fairly homogeneous unit in the Oriental Region, and *javanica* represents a brachypterous, but otherwise unchanged, derivative from *japonica*. A less extreme trend towards brachypterism is shown by *chinensis*; neither this species nor *spatula* has any very close affinity with the other oriental species. *Noia testacea* Walker is related to the oriental species of *Ducetia* Stål, but again shows no close affinity with any one of them. Among the African species, *loosi* and its very close relative *fuscopunctata* represent the closest approach to the oriental facies (as typified by *japonica*), though there may be some phylogenetic connection between *crosskeyi* and either *spatula* or *chinensis*. *Macrocercera* and *costata* are probably offshoots from *loosi*. The three species *chelocerca*, *ramulosa*, and *sagitta*, show a development towards the distinctive East African facies, typified by *punctipennis*. This trend reaches its fullest expression in the deserticolous species *vitriala* and *parva*. *Punctata* is clearly a brachypterous offshoot from *punctipennis*.

DISTRIBUTION (see Text-fig. 2). The range of this genus covers most of the Ethiopian Region and extends through the Oriental Region to New Guinea, the Solomon Is., and northern Australia. It also includes Manchuria, Korea and Japan.

KEY TO THE SPECIES (including *Noia testacea* Walker, see p. 207)

Males

- |   |   |
|---|---|
| 1. Hind wings rudimentary . . . . .   | 2 |
| — Hind wings well developed . . . . .   | 4 |
| 2. Subgenital plate deeply bifurcate, as in Text-figs. 5 and 23 (Oriental Region) . . . . . | 3 |



- Subgenital plate bilobed but not deeply bifurcate, as in Text-fig. 20. (Ethiopian Region) . . . . . *D. punctata* (Schulthess) (p. 203)
- 3. Subgenital plate as in Text-fig. 5. Cerci as in Text-fig. 32 *D. javanica* (Brunner) (p. 188)
- Subgenital plate as in Text-fig. 23. Cerci as in Text-fig. 50 *Noia testacea* Walker (p. 207)
- 4. Palaearctic, Oriental, and Australasian species . . . . . 5
- African species . . . . . 10

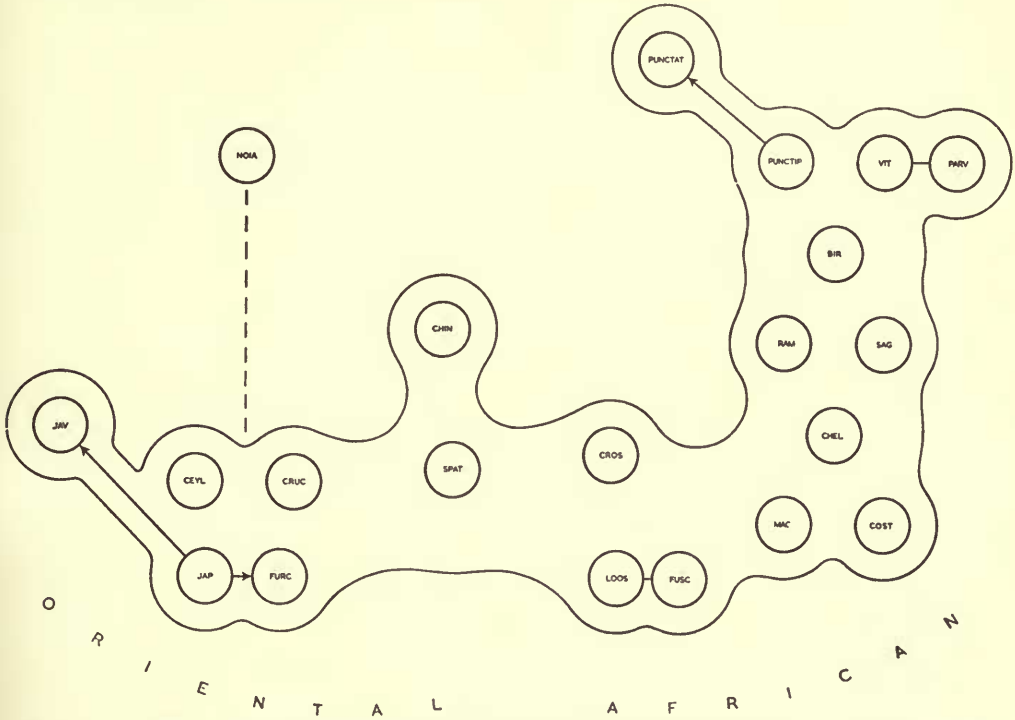


FIG. 1. Diagram showing the probable inter-relationships of the species of *Ducetia* Stål. (The abbreviations of specific names are the same as those given in Text-figs. 3-23.)

- 5. Subgenital plate with two inwardly-directed apical teeth, as in Text-fig. 24, not bifid when viewed from below (Text-fig. 8) . . . . . *D. chinensis* (Brunner) (p. 190)
- Subgenital plate without apical teeth, bifid when viewed from below . . . . . 6
- 6. Fore wings more than 35 mm. in length. Subgenital plate as in Text-fig. 7 *D. ceylanica* Brunner (p. 189)
- Fore wings less than 35 mm. in length. Subgenital plate not as in Text-fig. 7 . . . . . 7
- 7. Subgenital plate as in Text-fig. 6, the distal lobes widely separated *D. cruciata* Brunner (p. 189)
- Subgenital plate not as in Text-fig. 6, the distal lobes contiguous or nearly so (Text-figs. 3, 4, and 9) . . . . . 8
- 8. Cerci as in Text-fig. 36, with a dorsal and ventral ridge at the apex. Subgenital plate as in Text-figs. 9 and 26 . . . . . *D. spatula* sp. n. (p. 191)
- Cerci as in Text-fig. 30 or 31, with only a ventral ridge at the apex or without ridges. Subgenital plate not as in Text-figs. 9 and 26 . . . . . 9
- 9. Venation of fore wings as in Text-fig. 52, R branched dichotomously. Cerci as in Text-fig. 31, without an apical ridge . . . . . *D. furcata* sp. n. (p. 186)

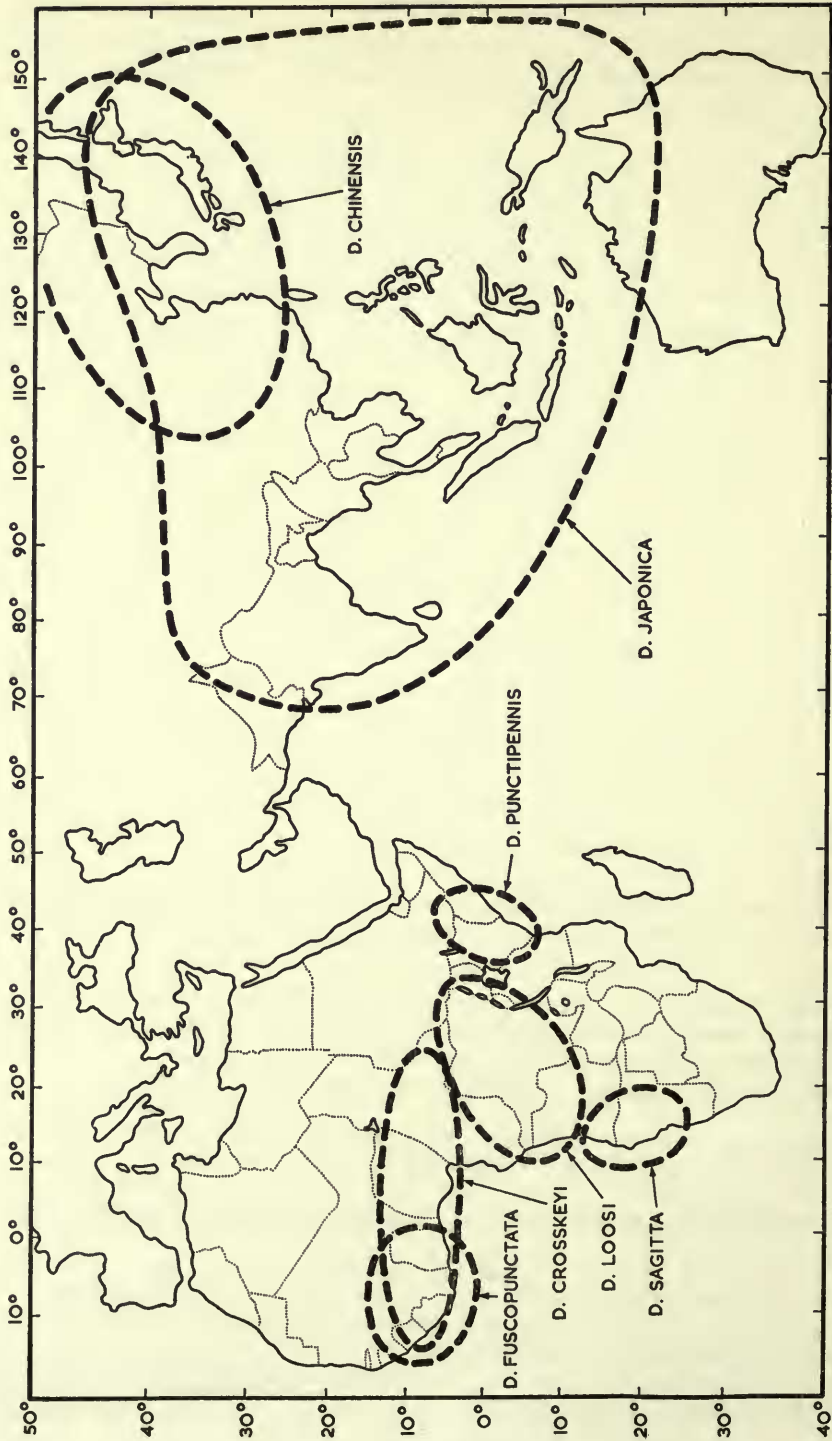
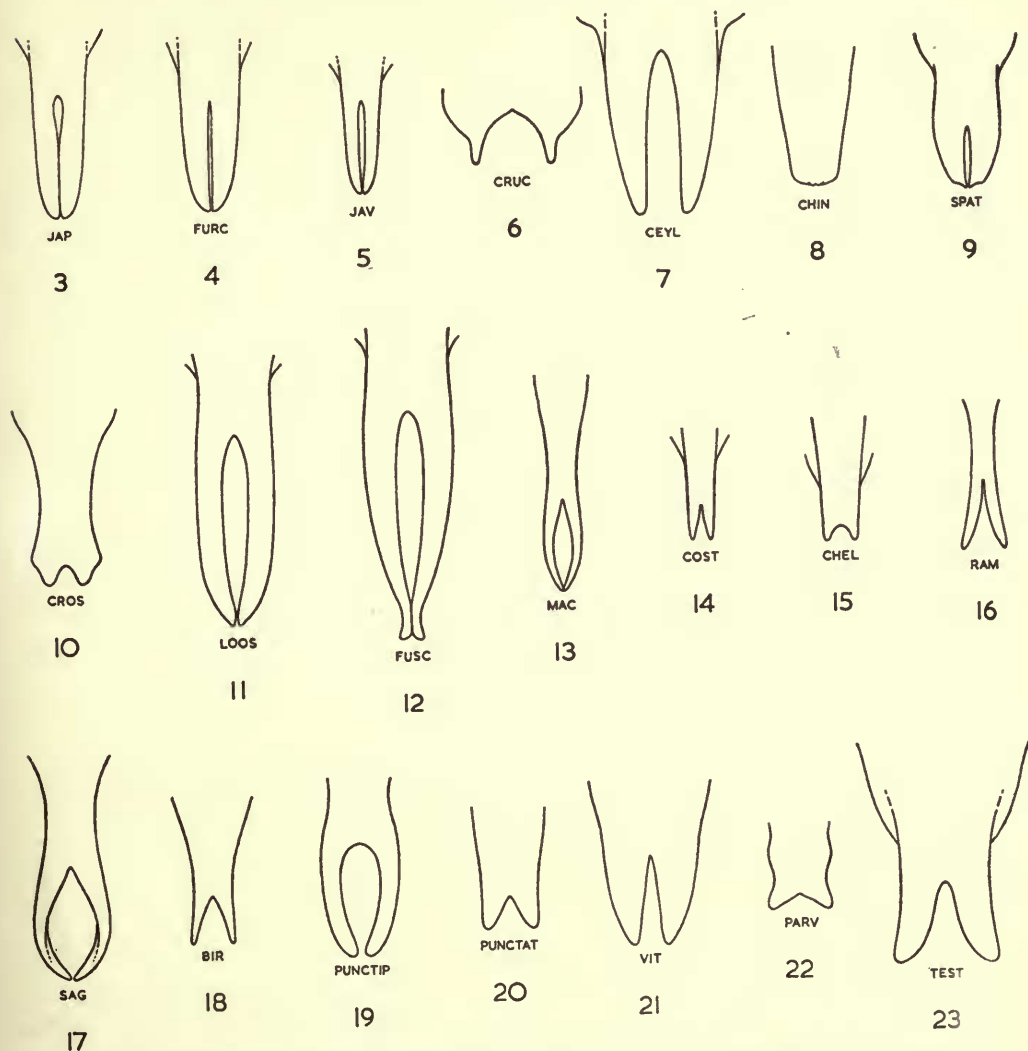


FIG. 2. Map showing the approximate distribution of some of the species of *Ducetia* Stål.

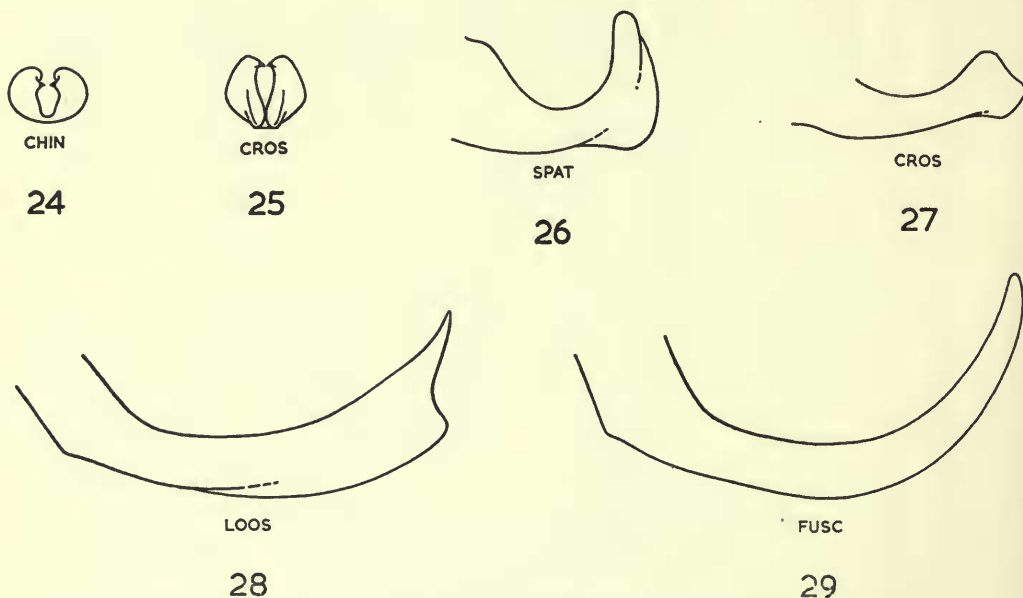
- . Venation of fore wings as in Text-fig. 51, R branched pectinately. Cerci as in Text-fig. 30, with an interno-ventral ridge at the apex *D. japonica* (Thunberg) (p. 182)
10. Subgenital plate as in Text-figs. 10, 25, and 27, with two inwardly-directed apical teeth *D. crosskeyi* sp. n. (p. 192)
- . Subgenital plate not as in Text-figs. 10, 25, and 27, without apical teeth . . . . . II



FIGS. 3-23. Ventral view of the male subgenital plate of (3) *Ducetia japonica* (Thunberg); (4) *D. furcata* sp. n.; (5) *D. javanica* (Brunner); (6) *D. cruciata* Brunner; (7) *D. ceylanica* Brunner; (8) *D. chinensis* (Brunner); (9) *D. spatula* sp. n.; (10) *D. crosskeyi* sp. n.; (11) *D. loosi* Griffini; (12) *D. fuscopunctata* Chopard; (13) *D. macrocerca* sp. n.; (14) *D. costata* sp. n.; (15) *D. chelocerca* sp. n.; (16) *D. ramulosa* sp. n.; (17) *D. sagitta* sp. n.; (18) *D. biramosa* (Karsch); (19) *D. punctipennis* (Gerstaecker); (20) *D. punctata* (Schulthess); (21) *D. vitriata* sp. n.; (22) *D. parva* sp. n.; (23) *Noia testacea* Walker.



11. Lobes of the subgenital plate converging apically, contiguous, or almost so, at the apex (Text-figs. 11, 12, 13, 17, or 19) . . . . . 12  
 — Lobes of the subgenital plate diverging apically, widely separated at the apex (not as in Text-figs. mentioned) . . . . . 18  
 12. Right fore wing showing an expanded transparent area with regular cross-veins along the more proximal part of the posterior edge (not visible when the wings are flexed), as in Text-fig. 61. Cerci relatively long, extending at least to the apex of the subgenital plate . . . . . *D. macrocerca* sp. n. (p. 195)  
 — Right fore wing not as in Text-fig. 61. Cerci relatively shorter, not reaching the apex of the subgenital plate . . . . . 13



FIGS. 24-29. *Ducetia* Stål. 24-25. End view of the male subgenital plate of (24) *D. chinensis* (Brunner); (25) *D. crosskeyi* sp. n. 26-29. Lateral view of the male subgenital plate of (26) *D. spatula* sp. n.; (27) *D. crosskeyi* sp. n.; (28) *D. loosi* Griffini; (29) *D. fuscopunctata* Chopard.

13. Fore wings of shiny and transparent texture . . . . . 14  
 — Fore wings opaque and not shiny . . . . . 15  
 14. Subgenital plate as in Text-fig. 19 . . . . . *D. punctipennis* (Gerstaecker) (p. 202)  
 — Subgenital plate as in Text-fig. 21 . . . . . *D. vitriala* sp. n. (p. 204)  
 15. Right fore wing with a transparent patch in the basal region of areas R and MA . . . . . *D. punctipennis* (Gerstaecker) (p. 202)  
 — Areas R and MA of the right wing uniformly opaque . . . . . 16  
 16. Cerci swollen at the base, then abruptly constricted, and with a characteristically shaped apex, as in Text-fig. 44. Subgenital plate, when viewed from below, as in Text-fig. 17 . . . . . *D. sagitta* sp. n. (p. 199)  
 — Cerci tapering more uniformly from the base, as in Text-figs. 38 and 39. Subgenital plate, when viewed from below, as in Text-figs. 11 or 12 . . . . . 17  
 17. Subgenital plate, when viewed from the side, as in Text-fig. 28 . . . . . *D. loosi* Griffini (p. 193)

— Subgenital plate, when viewed from the side, as in Text-fig. 29 .

*D. fuscopunctata* Chopard (p. 194)

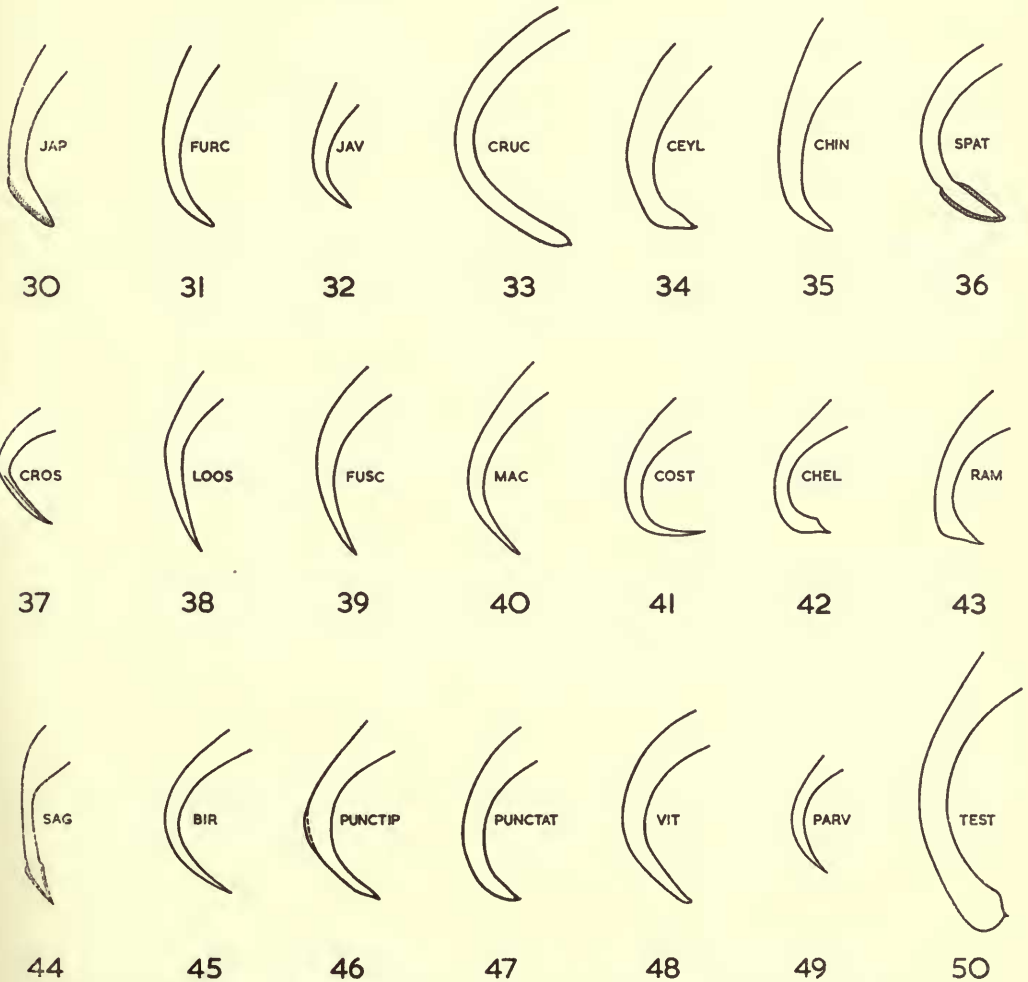
18. R of the fore wing with at least five posterior branches, as in Text-figs. 62 and 64 . 19

— R of the fore wing with four posterior branches or fewer . . . . . 20

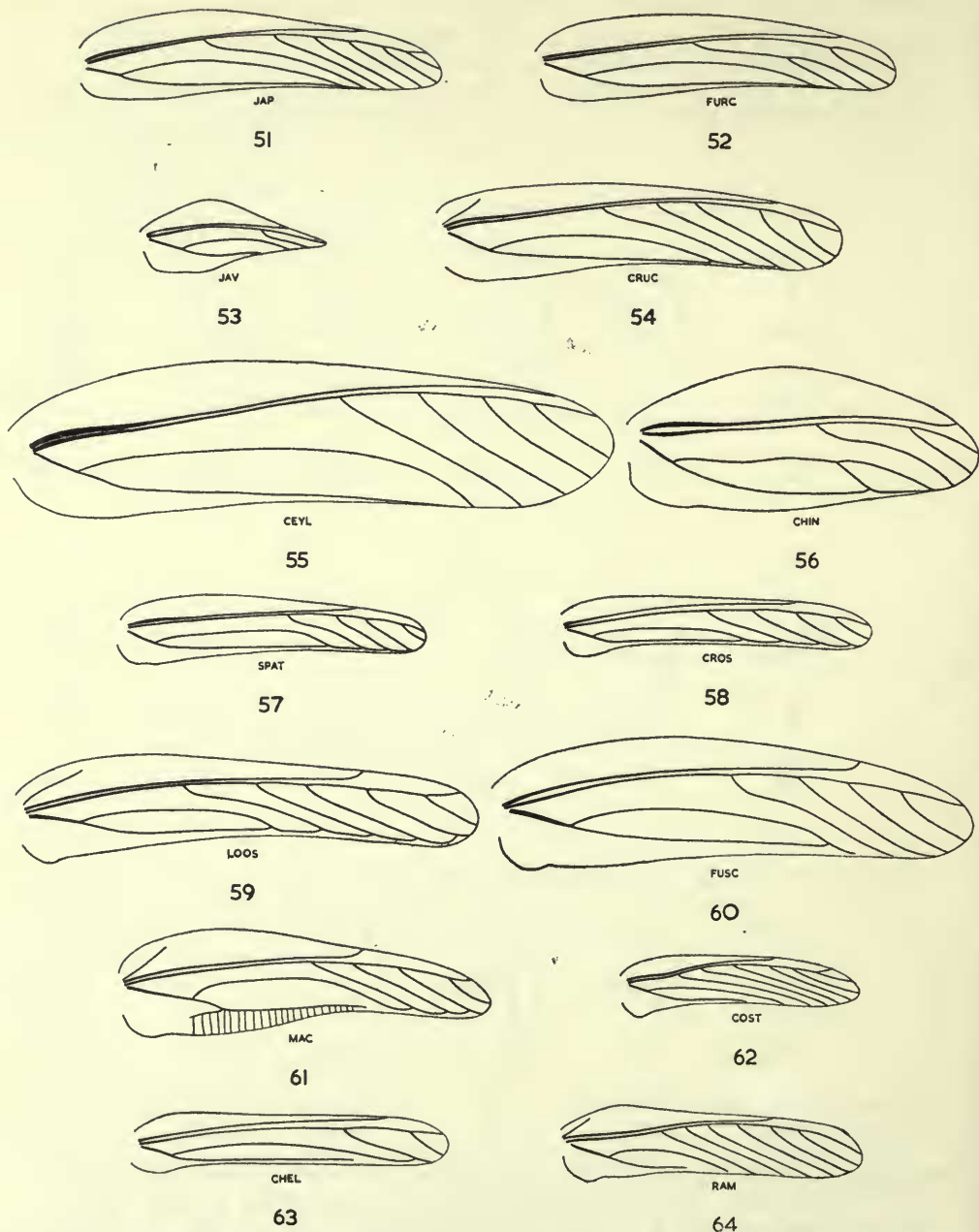
19. Cerci somewhat swollen subapically, as in Text-fig. 43 . . . . . *D. ramulosa* sp. n. (p. 198)

— Cerci not swollen subapically, with a long fine point, as in Text-fig. 41

*D. costata* sp. n. (p. 196)



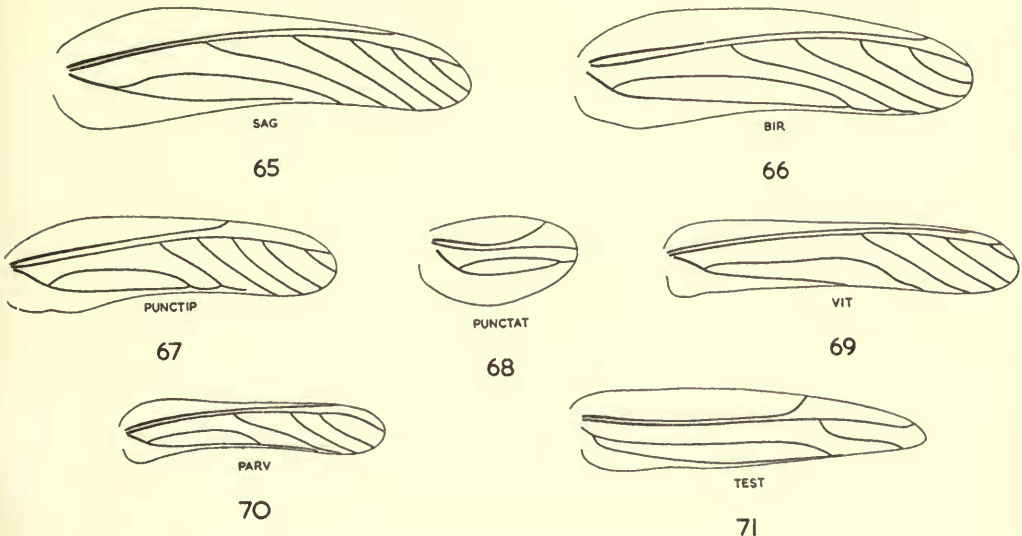
FIGS. 30-50. Dorsal view of the left male cercus of (30) *Ducetia japonica* (Thunberg); (31) *D. furcata* sp. n.; (32) *D. javanica* (Brunner); (33) *D. cruciata* Brunner; (34) *D. ceylanica* Brunner; (35) *D. chinensis* (Brunner); (36) *D. spatula* sp. n.; (37) *D. crosskeyi* sp. n.; (38) *D. loosi* Griffini; (39) *D. fuscopunctata* Chopard; (40) *D. macrocerca* sp. n.; (41) *D. costata* sp. n.; (42) *D. chelocerca* sp. n.; (43) *D. ramulosa* sp. n.; (44) *D. sagitta* sp. n.; (45) *D. biramosa* (Karsch); (46) *D. punctipennis* (Gerstaecker); (47) *D. punctata* (Schulthess); (48) *D. vitriala* sp. n.; (49) *D. parva* sp. n.; (50) *Noia testacea* Walker,



FIGS. 51-64. The right male fore wing of (51) *Ductetia japonica* (Thunberg); (52) *D. furcata* sp. n.; (53) *D. javanica* (Brunner); (54) *D. cruciata* Brunner; (55) *D. ceylanica* Brunner; (56) *D. chinensis* (Brunner); (57) *D. spatula* sp. n.; (58) *D. crosskeyi* sp. n.; (59) *D. loosi* Griffini; (60) *D. fuscopunctata* Chopard; (61) *D. macrocerca* sp. n.; (62) *D. costata* sp. n.; (63) *D. chelocerca* sp. n.; (64) *D. ramulosa* sp. n.



20. Fore wings of shiny and transparent texture. (Not known from south of the equator) 21  
 —. Fore wings opaque, at least towards the base, and not particularly shiny. (Not known from north of the equator) . . . . . 22
21. Subgenital plate as in Text-fig. 21. Total length more than 27 mm. *D. vitriala* sp. n. (p. 204)  
 —. Subgenital plate as in Text-fig. 22. Total length less than 27 mm. *D. parva* sp. n. (p. 205)
22. Cerci tapering evenly to a fine point, as in Text-fig. 45 *D. biramosa* (Karsch) (p. 200)  
 —. Cerci somewhat swollen subapically, as in Text-fig. 42 . . . *D. chelocerca* sp. n. (p. 197)



FIGS. 65-71. The right male fore wing of (65) *Ducetia sagitta* sp. n. ; (66) *D. biramosa* (Karsch) ; (67) *D. punctipennis* (Gerstaecker) ; (68) *D. punctata* (Schulthess) ; (69) *D. vitriala* sp. n. ; (70) *D. parva* sp. n. ; (71) *Noia testacea* Walker.

Females

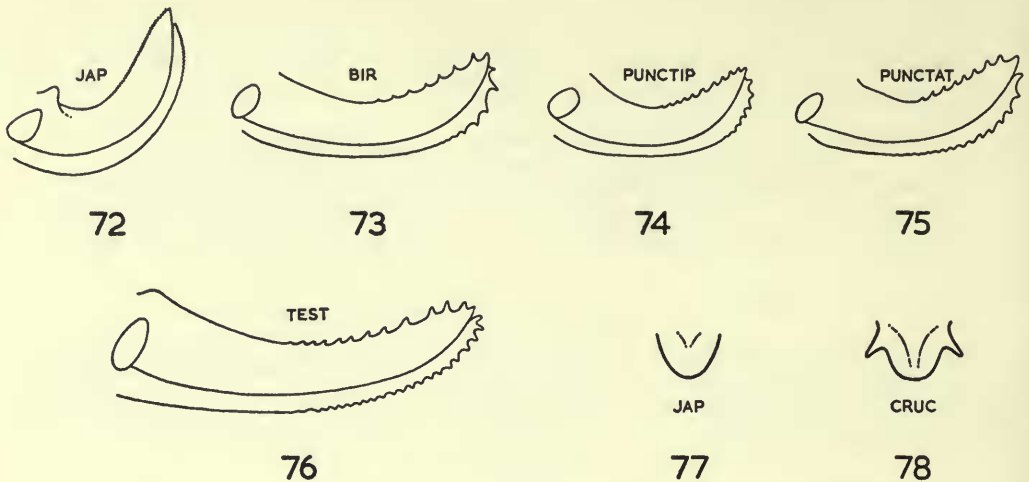
The thirteen African species are not included in this key, since the female sex is known in only seven of them. *D. spatula* sp. n., known only from the male holotype, is also omitted.

1. Hind wings rudimentary . . . . . 2  
 —. Hind wings well developed . . . . . 3
2. Ovipositor more than 8 mm. in length, shaped as in Text-fig. 76 *Noia testacea* Walker (p. 207)  
 —. Ovipositor less than 8 mm. in length, shaped as in Text-fig. 72 *D. javanica* (Brunner) (p. 188)
3. Hind wings extending beyond the flexed fore wings . . . . . 4  
 —. Hind wings not extending beyond the flexed fore wings *D. chinensis* (Brunner) (p. 190)
4. R of the fore wings branched in a dichotomous fashion, as in Text-fig. 80 *D. furcata* sp. n. (p. 186)  
 —. R of the fore wings branched in a pectinate fashion, not as in Text-fig. 80 . . . . . 5
5. Fore wings less than four times longer than their maximum width, their venation as in Text-fig. 83 . . . . . *D. ceylanica* Brunner (p. 189)  
 —. Fore wings more than four times longer than their maximum width, their venation as in Text-figs. 79 and 82 . . . . . 6

6. Subgenital pate with a posteriorly directed process on each side, as in Text-fig. 78

*D. cruciata* Brunner (p. 188)

-. Subgenital plate unmodified, as in Text-fig. 77 . . . *D. japonica* (Thunberg) (p. 182)



FIGS. 72-78. *Ducetia* Stål and *Noia* Walker. 72-76. Lateral view of the ovipositor of (72) *Ducetia japonica* (Thunberg); (73) *D. biramosa* (Karsch); (74) *D. punctipennis* (Gerstaecker); (75) *D. punctata* (Schulthess); (76) *Noia testacea* Walker. 77-78. Ventral view of the female subgenital plate of (77) *D. japonica* (Thunberg); (78) *D. cruciata* Brunner.

### 1. *Ducetia japonica* (Thunberg, 1815)

*Locusta japonica* Thunberg, 1815, *Mém. Acad. Sci. St-Petersb. (Sci. phys.)* 5: 282. Type locality: Japan. Type material lost.

*Locusta (Phaneroptera) quinquenervis* Haan, 1842, in Temminck, *Verh. nat. ges. Ned. overz. bezitt., Zool. (Ins.)*, p. 193. Lectotype ♂, JAPAN (*v. Siebold*). 2 ♂ and 2 ♀ syntypes, same data as lectotype. 2 ♂ syntypes, JAVA (*Blume*). All in the Rijksmuseum van Natuurlijke Historie, Leiden.

*Steirodon lanceolatum* Walker, 1859, *Ann. Mag. nat. Hist.* (3) 4: 222. Lectotype ♂, CEYLON, and 3 ♀ syntypes, same data as lectotype, in the British Museum (Natural History); 3 syntypes, same data as lectotype, lost.

*Phaneroptera neochlora* Walker, 1869, *Catalogue of Dermaptera Saltatoria*, p. 342. Lectotype ♂, CHINA. 2 ♀ syntypes, same data as lectotype. In the British Museum (Natural History).

*Phaneroptera privata* Walker, 1869, *Catalogue of Dermaptera Saltatoria*, p. 344. Holotype ♂, EAST PAKISTAN: Sylhet. In the British Museum (Natural History).

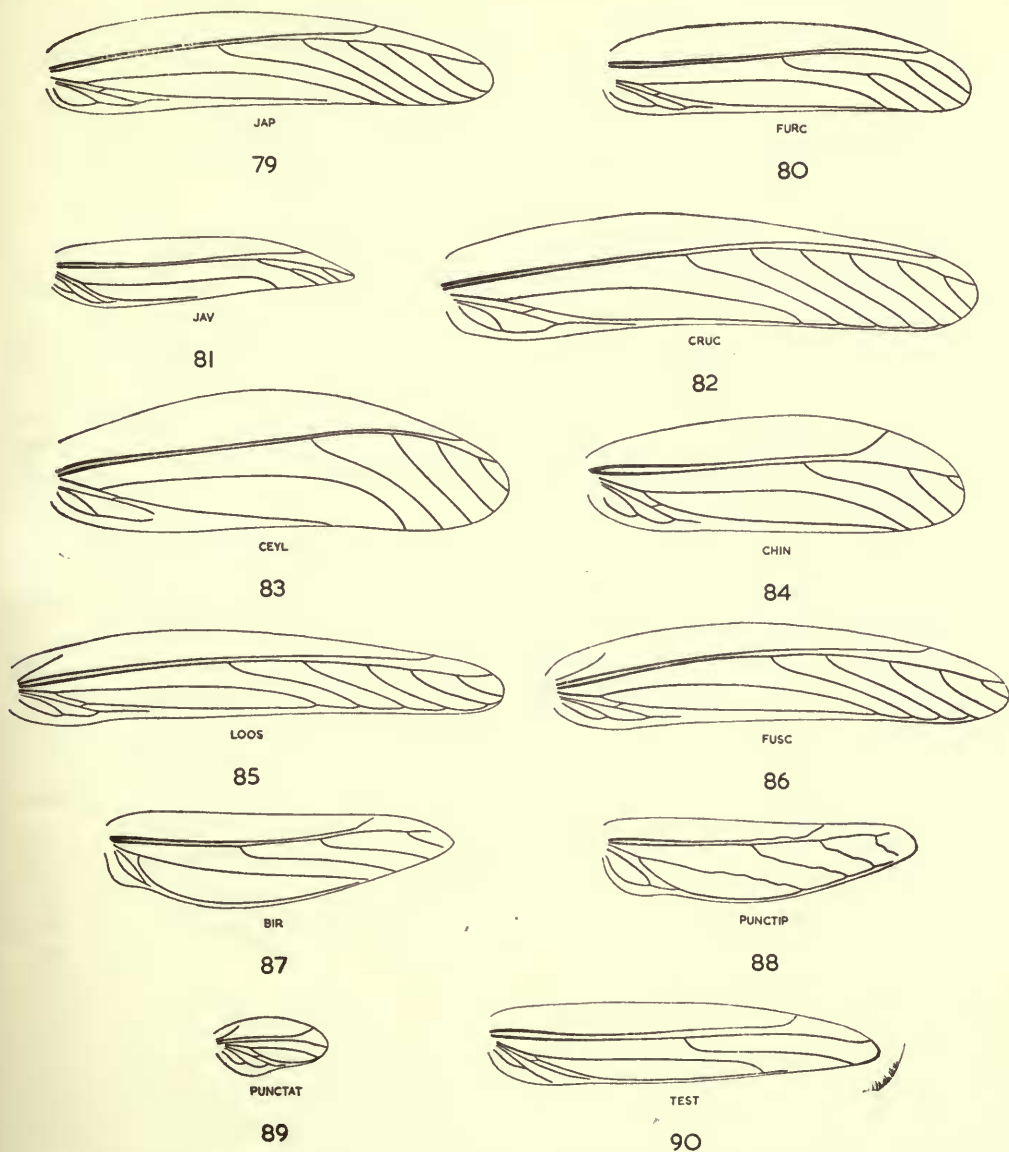
*Phaneroptera aliena* Walker, 1869, *Catalogue of Dermaptera Saltatoria*, p. 347. Holotype ♂, EAST PAKISTAN: Sylhet. In the British Museum (Natural History).

*Ducetia adspersa* Brunner, 1878, *Monographie der Phaneropteriden*, p. 110. Holotype ♂, PHILIPPINE Is.: Manila. In the Zoologisches Museum of the Humboldt-Universität, Berlin. *Syn. n.*

DIAGNOSIS. ♂. Venation of fore wings as in Text-fig. 51, R almost always with 4-6 closely parallel posterior branches. Cerci as in Text-fig. 30, with interno-

ventral ridge at apex. Subgenital plate as in Text-fig. 3, deeply bifurcate with contiguous lobes.

♀. Venation of fore wings as in Text-fig. 79.



FIGS. 79-90. The right female fore wing of (79) *Ducetia japonica* (Thunberg); (80) *D. furcata* sp. n.; (81) *D. javanica* (Brunner); (82) *D. cruciata* Brunner; (83) *D. ceylanica* Brunner; (84) *D. chinensis* (Brunner); (85) *D. loosi* Griffini; (86) *D. fuscopunctata* Chopard; (87) *D. biramosa* (Karsch); (88) *D. punctipennis* (Gerstaecker); (89) *D. punctata* (Schulthess); (90) *Noia testacea* Walker.



## MEASUREMENTS

*Males*

- Total length (20) : 32.4-46.1, mean 36.84.  
 Median length of pronotum (20) : 3.1-4.7, mean 3.68.  
 Length of hind femur (20) : 15.0-26.6, mean 20.46.  
 Length of fore wing (20) : 22.4-32.3, mean 25.48.

*Females*

- Total length (20) : 33.7-46.7, mean 38.56.  
 Median length of pronotum (20) : 3.6-5.6, mean 4.02.  
 Length of hind femur (20) : 18.5-26.8, mean 21.49.  
 Length of fore wing (20) : 24.4-33.5, mean 27.54.  
 Length of ovipositor (20) : 5.2-6.8, mean 5.87.

DISCUSSION. The shape and venation of the fore wings, with the five (occasionally four or six) posterior radial branches, and the male genitalia, enable this species to be easily recognized. Occasionally the regular pattern of the radial branches is lost (as in the holotype of *D. adspersa* Brunner, which clearly belongs to the present species), probably as a result of a genetic alteration, in which case identification must depend on the genitalia. Freak specimens of this sort, which occur intermingled with normal ones, may easily be confused with *D. furcata* sp. n., in which, however, the male cerci lack the interno-ventral ridge at the apex.

*D. japonica* (Thunberg) is the most common and widespread of the Asiatic species of *Ducetia* Stål. Although specimens from the Solomon Is. (and, to a lesser extent, New Guinea) are quite considerably larger than those from any other part of the range, there is generally very little geographical variation. Individual variation is also not very marked: the usual green colouring is occasionally replaced by brown, however, and there may or may not be dark spots on the fore wings.

I have examined the holotype of *D. adspersa* Brunner and have found it to belong to *D. japonica* (Thunberg).

I have selected and marked a male lectotype from among the syntypes of *Locusta* (*Phaneroptera*) *quinquenervis* Haan, a male lectotype from among the syntypes of *Steirodon lanceolatum* Walker, and a male lectotype from among the syntypes of *Phaneroptera neochlora* Walker.

## MATERIAL EXAMINED

♂ lectotype, 1 ♂ syntype (Java), and 1 ♀ syntype (Japan), of *Locusta* (*Phaneroptera*) *quinquenervis* Haan. ♂ lectotype and 3 ♀ syntypes of *Steirodon lanceolatum* Walker. One ♂ lectotype and 2 ♀ syntypes of *Phaneroptera neochlora* Walker. ♂ holotype of *Phaneroptera privata* Walker. ♂ holotype of *Phaneroptera aliena* Walker. ♂ holotype of *D. adspersa* Brunner.

INDIA: Coorg, Fraserpet, 29.i.1924 (*Fletcher*) (1 ♂); Pusa, x.1908, on grass (*T. N. J.*) (1 ♂); Pusa, 15.xi.1904 (—) (1 ♀); Tukdah, 12 miles east of Darjeeling, 5,000 ft. (*Sevastopulo*) (1 ♂, 3 ♀); Assam (—) (1 ♂); Assam, Kahao,

Lohit Valley, 4,000–5,000 ft., 15–20. xi. 1926 (*Kingdon Ward*) (1 ♀); Assam, Mishmi Hills, Delai Valley, Taphlogam, 4,000–5,000 ft., 8. xi. 1936 (*Steele*) (1 ♂); Assam, Mishmi Hills, Delai Valley, Chanliang, 4,840 ft., 25. xi. 1936 (*Steele*) (1 ♂); Assam, Mishmi Hills, Delai Valley, Talon, 9,000–10,000 ft., 25. xi. 1936 (*Steele*) (1 ♀); Shambaganur, Madura, 1922 (*Anglade*) (1 ♀); Shambaganur, Madura (—) (1 ♂); Bolampatti Valley, Coimbatore distr., 20. iv. 1937 (*B.M.-C.M. Exp.*) (4 ♂, 4 ♀); Siruvani, Coimbatore distr., 1,700 ft., 23–26. ix. 1938 (*B.M.-C.M. Exp.*) (1 ♀); Nadungayam, Malabar, 200 ft., 16–22. ix. 1938 (*B.M.-C.M. Exp.*) (9 ♂, 5 ♀); Chenat Nair Forest, Palghet, 16. iv. 1937 (*B.M.-C.M. Exp.*) (2 ♂); Top Slip Camp, Nelliampathi Hills, 26. iv. 1937 (*B.M.-C.M. Exp.*) (2 ♂); Tenmalai, Travancore, 500–800 ft., 11–17. x. 1938 (*B.M.-C.M. Exp.*) (1 ♀); Thekkadi, Periyar Dam, Travancore, 6–10. v. 1937 (*B.M.-C.M. Exp.*) (1 ♂, 1 ♀); Pirmed, Travancore, 3,400 ft., 4–6. v. 1937 (*B.M.-C.M. Exp.*) (1 ♂); Lebong, 3,000 ft., ix. 1908 (*M. M. I.*) (1 ♀); Assam, nr. Ledo, vi–xi. 1944 (*Rehn*) (5 ♂, 3 ♀); Assam, south side of R. Brahmaputra, opposite Sadiya, 24. vii. 1944 (*Rehn*) (1 ♀); Kallar, 1,500 ft., 18. v. 1923 (*Nathan*) (1 ♂); Coorg, Sidapur, 13–14. v. 1914 (*Fletcher*) (1 ♂); Bellary distr., Ramandrug, 3,500 ft., on *Lantana*, 29. viii. 1918 (*A. G. R.*) (1 ♂); PAKISTAN: Dacca, vii–ix. 1945 (*Leston*) (1 ♂, 1 ♀); CEYLON: Peradeniya, 1909–10 (*Green*) (7 ♂); Peradeniya, iii. 1901 (—) (1 ♂); Peradeniya, iii. 1907 (—) (1 ♂); — (*Green*) (1 ♂); Wavena Estate, v. 1954 (*Brown*) (1 ♂); —, 1891 (*Heuser*) (3 ♂, 2 ♀) (Nat. Mus. Vienna); KASHMIR: Srinagar, 5,200 ft., at light, 5. viii. 23 (*Fletcher*) (1 ♂); NEPAL: Phewa Tal, nr. Pokhara, 2,500 ft., 10. v. 1954 (*Quinlan*) (1 ♂); SIKKIM: Gantok, 5,000 ft., in vegetation, 26. vii. 1924 (*Hingston*) (2 ♂); TIBET: Zayul, Rima, 5,000 ft., 11. viii. 1933 (*Kingdon Ward & Kaulback*) (1 ♀); BURMA: Shingbwiayang, 665 ft., v–vi. 1945 (*Rehn*) (3 ♂); Myitkyina, 9–10. vi. 1944 (*Rehn*) (2 ♂); — (*Hough*) (1 ♂); 27° 50' N., 97° 50' E., 3,000 ft., 12. ix. 1926 (*Kingdon Ward*) (1 ♂); Sadon, 1. vii. 1934 (*Malaise*) (1 ♂); Mishmi Hills, Delei River, 1,700 ft., 1. ii. 1935 (*Steele*) (1 ♀); Mishmi Hills, Pange, 1,650 ft., 23. i. 1935 (*Steele*) (2 ♂); Nam Tamai Valley, 27° 42' N., 97° 54' E., 3,000 ft., vii–ix. 1938 (*Kaulback*) (7 ♂, 4 ♀); Nam Tamai Valley, 27° 40' N., 97° 55' E., 3,800 ft., 22. vii. 1938 (*Kaulback*) (2 ♂, 1 ♀); Nam Tamai Valley, 3,500 ft., 12. ix. 1938 (*Kaulback*) (1 ♀); Seinghku Valley, Nam Tamai, 28° 5' N., 97° 35' E., 4,000 ft., 13–14. viii. 1926 (*Kingdon Ward*) (1 ♂, 1 ♀); CHINA: Ushan, nr. Tsingtau, ix–x. 1954 (*Bei-Bienko*) (1 ♂, 1 ♀); Foochow, 1936–38 (*Yang*) (5 ♂, 3 ♀); Hainan, Mt. Wuchi, 15–21. v. 1903 (—) (3 ♂); THAILAND: Bangkok Noi, 11. vi. 1926 (*Ladell*) (1 ♀); Upper Pran (?) River, 12. iv. 1926 (*Ladell*) (1 ♀); Patalung, at light, 4. v. 1924 (*Evans*) (1 ♀); INDO-CHINA: South Annam, Langbian Province, Langbian Peaks, 6,000–7,500 ft., iv. 1918 (*Boden Kloss*) (1 ♂); Tonkin, 1908 (*Gronvelle*) (1 ♂) (Mus. Hist. Nat. Paris); KOREA: — (—) (1 ♂); JAPAN: Sagami-Hakusan, 25. ix. 1949 (*Fukuhara*) (1 ♂); Tokyo, Setagaya Nezu-hill, 15. viii. 1948 (*Fukuhara*) (1 ♀); — (—) (1 ♂); Tokyo, 7. v. 1938 (*Abe*) (1 ♂) (Zool. Inst. Lund.); — (*Dönitz*) (1 ♀) (Zool. Mus. Berlin); —, 1891 (*Deyrolle*) (1 ♀) (Mus. Hist. Nat. Paris); FORMOSA: — (*Holst*) (1 ♂); Takao, vii–x. 1907 (*Sauter*) (2 ♂, 3 ♀) (Nat. Mus. Vienna); Lake Candidius, 15–31. x. 1907 (*Sauter*) (1 ♂) (Nat. Mus. Vienna); MALAYA: Batang Padang, 10. iii. 1921 (*Pendlebury*) (1 ♂); Kuala Lumpur, at light, 1922–31 (*Pendlebury*) (4 ♂, 1 ♀);

Kuala Lumpur, 1921-26 (*Pendlebury*) (4 ♂); Senangor, Cheras Road, at light, 1924-27 (*Seimund*) (3 ♂); Kedah, nr. Jitra, catchment area, at light, 4-10.iv.1928 (*Pendlebury*) (15 ♂); Selangor, Bukit Cherakah, 27-31.vii.1921 (*Pendlebury*) (1 ♂); Senangor, Ginting Bidai, 2,000 ft. (*Kloss*) (1 ♂, 1 ♀); Kuala Lumpur (*Lea et al.*) (1 ♂) (South Australian Museum); Gap, Fraser's Hill (*Lea*) (1 ♀) (South Australian Museum); Pahang, Kuala Jahan, 300 ft., 26.xi.1921 (*Pendlebury*) (1 ♂); Batang Padang, 24.v.1923 (*Pendlebury*) (1 ♂); Jelai Pahang, 1917 (—) (1 ♂, 1 ♀); Klang Gates, vii-x.1932 (*Miller*) (2 ♂, 1 ♀); Kuanton Pahang, 8.vi.1933 (*Miller*) (1 ♂); Bukit Cherakah, 10.vii.1932 (*Miller*) (2 ♂); The Gap, in jungle, 8.viii.1928 (*Miller*) (1 ♀); Kuala Lumpur, at light, viii-ix.1928 (*Miller*) (4 ♂); Kuala Lumpur, ii.1929 (*Miller*) (2 ♂); Tampin, 30.iv.1936 (*Miller*) (1 ♂); SINGAPORE: — (*Ridley*) (3 ♂); SUMATRA: xi.1877-vi.1878 (—) (3 ♂, 1 ♀) (*Rijksmus. Nat. Hist. Leiden*); Deli (*Martin*) (1 ♂, 1 ♀) (*Zool. Mus. Berlin*); JAVA: Tengger Mts. (*Fruhstorfer*) (1 ♀) (*Zool. Mus. Berlin*); Tjikavang, xi.1937 (*Walsh*) (1 ♀) (*Zool. Inst. Lund*); Tjikavang, Mt. Djampang, x.1937 (*Walsh*) (1 ♂, 1 ♀) (*Zool. Inst. Lund*); Buitenzorg (*Lea*) (1 ♂) (South Australian Museum); SARAWAK: 1909 (*Brooks*) (1 ♀); BORNEO: Samarinda, ii.1939 (*Walsh*) (1 ♂) (*Zool. Inst. Lund*); Sambas, 1891 (*Bossha*) (1 ♂) (*Rijksmus. Nat. Hist. Leiden*); PHILIPPINE IS.: — (*Banks*) (1 ♂, 1 ♀); — (*Ledyard*) (1 ♀); TUKANGBESI IS.: Binongko, Toekang, 7-10.iii.1930 (*Snellius Exp.*) (1 ♂) (*Rijksmus. Nat. Hist. Leiden*); NEW GUINEA: Maprik, 28.x.1957 (*Smart*) (1 ♂); Lumi, 1.xi.1957 (*Smart*) (1 ♀); Popondetta distr., Sangara, 23.iii.1956 (*Brown*) (2 ♂); NE. Papua, Mt. Lamington, 1,300-1,500 ft. (*McNamara*) (4 ♂, 2 ♀) (South Australian Museum); N. Territory, Groote Eylandt (*Tindale*) (1 ♂) (South Australian Museum); Madang (*Lohe*) (1 ♂) (South Australian Museum); AUSTRALIA: Cairns distr. (*Lea*) (2 ♀) (South Australian Museum); Cairns (*Lea*) (1 ♂) (South Australian Museum); Cairns distr. (*Dodd*) (3 ♂) (South Australian Museum); N. Territory, Grove Hill (—) (1 ♂) (South Australian Museum); SOLOMON IS.: Guadalcanal, Honiara distr., Kukum, 1954-56 (*Brown*) (6 ♂); Guadalcanal, Honiara distr., Tenaru, 1954-56 (*Brown*) (9 ♂, 3 ♀); Guadalcanal, Poha River, 22.viii.1954 (*Brown*) (1 ♀); Guadalcanal, Rua Vatu, 18.viii.1955 (*Brown*) (1 ♂); Buin, 23.vii.1922 (*Armytage*) (1 ♂).

In the British Museum (Natural History) unless otherwise stated.

DISTRIBUTION (Text-fig. 2). *D. japonica* (Thunberg) ranges over the whole of Asia south of latitude 40° N. and east of longitude 70° E. It is found throughout Indonesia, extending eastwards to the Solomon Is. and southwards to northern Australia.

## 2. *Ducetia furcata* sp. n.

Holotype ♂, FORMOSA: Takao, 17.viii.1907 (*Sauter*). In the Naturhistorisches Museum, Vienna.

DIAGNOSIS. ♂. Venation of fore wings as in Text-fig. 52,  $R_s$  bifurcate. Cerci as in Text-fig. 31, without interno-ventral ridge at apex. Subgenital plate as in Text-fig. 4.

♀. Venation of fore wings as in Text-fig. 80.

DESCRIPTION. ♂. Fastigium of vertex compressed, sulcate above.



Pronotum without lateral carinae. Fore coxae with very small spine. Fore femora with about 4-11 external spinules. Mid femora with about 11-14 external spinules. Hind femora with terminal dorsal point and with about 9-11 external spinules. Hind tibiae with about 55-100 external dorsal spines. Venation of fore wings as in Text-fig. 52,  $R_s$  bifurcate. Hind wings extending beyond fore wings by between fifth and sixth length of latter.

Tenth abdominal tergite enlarged. Supra-anal plate slightly longer than broad, ligulate. Cerci as in Text-fig. 31, without interno-ventral ridge at apex. Subgenital plate as in Text-fig. 4.

Coloration green, with dark brown markings on vertex, antennae, pronotal disc, stridulatory organ, hind margin of fore wings, and parts of legs. Cerci with dark tip.

♀. As male except for wings and genitalia. Venation of fore wings as in Text-fig. 80. Hind wings extending beyond fore wings by about tenth length of latter. Ovipositor crenulate along distal two-thirds of dorsal margin and distal third of ventral margin.

#### MEASUREMENTS

##### *Males*

- Total length (4) : 34.6-36.4, mean 35.50.  
 Median length of pronotum (4) : 4.2-4.4, mean 4.27.  
 Length of hind femur (4) : 23.4-25.7, mean 24.12.  
 Length of fore wing (4) : 25.3-26.4, mean 25.95.

##### *Females*

- Total length (1) : 33.4.  
 Median length of pronotum (2) : 4.7-4.9, mean 4.80.  
 Length of hind femur (1) : 25.8.  
 Length of fore wing (2) : 24.5-25.8, mean 25.15.  
 Length of ovipositor (2) : 6.6-6.8, mean 6.70.

VARIATION. The femoral and tibial spines and spinules vary greatly in number.

DISCUSSION. In its size and general appearance this species resembles *D. japonica* (Thunberg); it may be distinguished from it, however, by the bifurcate  $R_s$  and, in the male, by the lack of an interno-ventral ridge at the apex of the cerci.

#### MATERIAL EXAMINED

♂ holotype; 1 ♂ and 1 ♀ paratype, FORMOSA: Takao, 11.viii.1907 (*Sauter*) (♂ in British Museum (Natural History), ♀ in Nat. Mus. Vienna); 1 ♂ paratype, FORMOSA: Takao, 30.vii.1907 (*Sauter*) (Nat. Mus. Vienna); 1 ♂ paratype, FORMOSA: Takao (*Sauter*) (Nat. Mus. Vienna).

FORMOSA: — (*Hilgendorf*) (1 ♀) (Zool. Mus. Berlin).

DISTRIBUTION. Known only from Formosa.

3. *Ducetia javanica* (Brunner, 1891) comb. n.

*Isotima javanica* Brunner, 1891, Additamenta zur Monographie der Phaneropteriden, p. 54. Lectotype ♂, JAVA: Tengger Mts. (*Fruhstorfer*). 2 ♂ and 2 ♀ syntypes, same data as lectotype; 1 ♀ syntype, JAVA (*Dohrn*). In the Naturhistorisches Museum, Vienna.

DIAGNOSIS. ♂. Hind wings rudimentary. Venation of fore wings as in Text-fig. 53. Cerci as in Text-fig. 32. Subgenital plate as in Text-fig. 5. ♀. Hind wings rudimentary. Venation of fore wings as in Text-fig. 81.

## MEASUREMENTS

*Males*

Total length (6): 16.4–19.8, mean 18.53.  
 Median length of pronotum (6): 2.6–3.3, mean 3.07.  
 Length of hind femur (5): 12.1–14.7, mean 13.82.  
 Length of fore wing (6): 13.2–15.1, mean 14.22.

*Females*

Total length (3): 23.7–24.6, mean 24.17.  
 Median length of pronotum (3): 3.2–3.6, mean 3.38.  
 Length of hind femur (3): 15.2–16.0, mean 15.67.  
 Length of fore wing (3): 18.6–19.4, mean 18.93.  
 Length of ovipositor (3): 4.8–5.0, mean 4.91.

DISCUSSION. This species is evidently a brachypterous derivative from *D. japonica* (Thunberg), which it closely resembles in every feature except the development of the wings and size.

I have selected and marked a male lectotype from among the syntypes of this species; this specimen bears the number 18.170.

## MATERIAL EXAMINED

♂ lectotype, 2 ♂ syntypes, and 3 ♀ syntypes.

JAVA: Mt. Tengger, Nongkadjadjar, 1,100 m., v. 1938 (*Walsh*) (3 ♂) (Zool. Inst. Lund).

DISTRIBUTION. Known only from the Tengger Mountains.

4. *Ducetia cruciata* Brunner, 1891

*Ducetia cruciata* Brunner, 1891, Additamenta zur Monographie der Phaneropteriden, p. 53. Lectotype ♂, INDO-CHINA: Cambodia (*Rosset*). 1 ♂ and 1 ♀ syntype, same data as lectotype. In the Naturhistorisches Museum, Vienna.

DIAGNOSIS. ♂. Venation of fore wings as in Text-fig. 54, R with 5 parallel posterior branches. Cerci as in Text-fig. 33. Subgenital plate as in Text-fig. 6.

♀. Subgenital plate with posteriorly directed process on each side, as in Text-fig. 78. Venation of fore wings as in Text-fig. 82.

## MEASUREMENTS

*Males*

Total length (3) : 37.4-44.1, mean 39.90.  
 Median length of pronotum (3) : 3.9-5.0, mean 4.51.  
 Length of hind femur (4) : 18.7-27.4, mean 23.30.  
 Length of fore wing (4) : 21.4-34.4, mean 29.32.

*Females*

Total length (2) : 40.9-47.3, mean 44.10.  
 Median length of pronotum (3) : 4.4-4.8, mean 4.57.  
 Length of hind femur (3) : 25.4-28.5, mean 27.97.  
 Length of fore wing (2) : 31.5-35.4, mean 33.45.  
 Length of ovipositor (2) : 5.3-5.6, mean 5.45.

DISCUSSION. This species has a similar wing-venation to *D. japonica* (Thunberg), but may be distinguished from it by the genitalia and larger size.

I have selected and marked a male lectotype from among the syntypes of this species ; this specimen bears the number 17.099.

## MATERIAL EXAMINED

♂ lectotype, ♂ syntype, and ♀ syntype.

BURMA : Toungoo (*Crumb*) (2 ♂, 2 ♀) (1 ♂ in British Museum (Natural History) ; remainder in Academy of Natural Sciences of Philadelphia).

DISTRIBUTION. This species is known only from Indo-China and Burma, but doubtless also occurs in Thailand.

5. *Ducetia ceylanica* Brunner, 1878

*Ducetia ceylanica* Brunner, 1878, Monographie der Phaneropteriden, p. 111. Holotype ♂, CEYLON (*Nietner* (?)). In the Zoologisches Museum of the Humboldt-Universität, Berlin.

DIAGNOSIS. ♂♀. Venation of fore wings as in Text-figs. 55 and 83, R with 3 or 4 posterior branches. Pronotum selliform. Supra-anal plate large and appar-

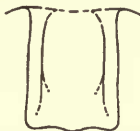


FIG. 91. Dorsal view of the male supra-anal plate of *D. ceylanica* Brunner.

ently fused to tenth abdominal tergite (male as in Text-fig. 91). Male cerci as in Text-fig. 34. Male subgenital plate as in Text-fig. 7.

## MEASUREMENTS

*Male*

Total length (2) : 53·8–54·8, mean 54·30.

Median length of pronotum (2) : 5·8–5·8, mean 5·80.

Length of hind femur (2) : 26·2–28·3, mean 27·25.

Length of fore wing (2) : 42·2–44·1, mean 43·15.

*Female*

Total length : 36·2.

Median length of pronotum : 5·5.

Length of hind femur : 26·9.

Length of fore wing : 30·5.

Length of ovipositor : 6·7.

DISCUSSION. This species may be easily recognized by the very prominent supra-anal plate and the large, broad, male fore wings.

## MATERIAL EXAMINED

♂ holotype.

CEYLON : Hakgalla, iii.1924 (—) (1 ♂) ; Woodside, Urugalla, II.ix.1922 (—) (1 ♀). Both in the British Museum (Natural History).

DISTRIBUTION. Known only from Ceylon.

6. *Ducetia chinensis* (Brunner, 1878) comb. n.

*Isotima chinensis* Brunner, 1878, Monographie der Phaneropteriden, p. 113. Holotype ♀, CHINA. Probably destroyed.

*Kuwayamaea sapporensis* Matsumura & Shiraki, 1908, *J. Coll. Agric. Tokyo*, 3 : 8. 2 ♂ syntypes and 2 ♀ syntypes, JAPAN : Sapporo and Josankei, ix (*Kuwayama*). In the collection of S. Matsumura. *Syn. n.*

*Kuwayamaea yezoensis* Matsumura, 1913, Thousand insects of Japan. Additamenta 1, p. 30. ? Nom. n. for *K. sapporensis* Matsumura & Shiraki.

*Anisotima chinensis* (Brunner), Bei-Bienko, 1954, *Fauna Rossii* (New Series), Orthoptera, 2 (2) : 88.

*Kuwayamaea chinensis* (Brunner), Bei-Bienko, 1955, *Zool. Zh.* 34 : 1252.

DIAGNOSIS. ♂. Subgenital plate as in Text-figs. 8 and 24, with two inwardly-directed apical teeth. Cerci as in Text-fig. 35. Venation of fore wings as in Text-fig. 56.

♀. Hind wings not extending beyond tips of flexed fore wings, but not rudimentary. Venation of fore wings as in Text-fig. 84.

## MEASUREMENTS

*Male*

Total length (5) : 30·3–35·0, mean 33·42.

Median length of pronotum (3) : 3·9–4·4, mean 4·23.

Length of hind femur (5) : 21·5–23·8, mean 22·92.

Length of fore wing (6) : 22·5–25·0, mean 23·72.



*Females*

Total length (2) : 30.0–32.2, mean 31.10.

Median length of pronotum (2) : 4.6–5.3, mean 4.95.

Length of hind femur (2) : 21.7–26.2, mean 23.95.

Length of fore wing (2) : 23.3–25.0, mean 24.15.

Length of ovipositor (2) : 7.2–8.2, mean 7.70.

DISCUSSION. Males of this species may be easily recognized by the very characteristic subgenital plate (Text.-fig. 24), and females by their somewhat reduced, though not rudimentary, hind wings.

The female holotype of this species was stated by Brunner (1878) to be in Budapest (presumably in the Magyar Nemzeti Múzeum) and is doubtless now destroyed. The four syntypes of *Kuwayamaea sapporensis* Matsumura & Shiraki were in Matsumura's collection and may now be in the Entomological Museum of Hokkaido University, but I have been unable to obtain these specimens or even to confirm their whereabouts. However, Dr. Asahina has very kindly sent me two male specimens of *K. sapporensis* Matsumura & Shiraki, one of which is from Ōnuma, not far from Jozankei and Sapporo, the type localities. I have further, through the courtesy of Professor G. Ya. Bei-Bienko and Dr. L. Mistshenko, been able to examine a specimen of each sex of *D. chinensis* (Brunner) from the "type locality", China. An examination of these specimens, and of four further specimens from Manchuria, Korea, and the Russian Far East, has convinced me that all belong to the same species. Such small differences as are apparent are not, in my opinion, of taxonomic value at the specific level. The female from the Russian Far East differs from the one from China in having a smaller ovipositor and relatively shorter hind wings; it is possible that further material will show this difference to be a geographical one.

## MATERIAL EXAMINED

CHINA : Kiangsu, Ihing, 9.viii.1933 (*Piel*) (1 ♀) (Zool. Inst. Leningrad); Nanking, 9.x.1942 (—) (1 ♂) (Zool. Inst. Leningrad); Manchuria, nr. Lake Hanka, 1900 (*Bohnhof*) (1 ♂) (Mus. Hist. Nat. Paris); U.S.S.R. : Ussuri, Spasski, Yakoulevka, 23.viii.1926 (*Diakonov & Philippiev*) (1 ♀) (Zool. Inst. Leningrad); KOREA : Quelpart I., S. Ichikawa, in grass, 1.ix.1905 (—) (1 ♂); JAPAN : Hokkaido, Ōnuma, 19.vii.1937 (*Asahina*) (1 ♂); Tokyo, Mt. Takao, 4.viii.1929 (*Asahina*) (1 ♂); KURIL Is. : Sikotan, nr. Akama, 9.ix.1949 (*Strelkov*) (1 ♂) (Zool. Inst. Leningrad).

In the British Museum (Natural History) unless otherwise stated.

DISTRIBUTION (Text.-fig. 2). The range of this species corresponds approximately to Wallace's Manchurian Sub-region.

7. *Ducetia spatula* sp. n.

Holotype ♂, INDO-CHINA : South Vietnam, Phanrang Prov., nr. Ca-Na, 700–900 m., 1923 (*Poilane*). In the Muséum National d'Histoire Naturelle, Paris.

DIAGNOSIS. ♂. Subgenital plate as in Text-figs. 9 and 26. Cerci as in Text-fig. 36, spatulate apically. Venation of fore wings as in Text-fig. 57.

♀ unknown.

DESCRIPTION. ♂. Fastigium of vertex moderately compressed, sulcate above.

Pronotum without lateral carinae. Fore coxae with small spine. Fore femora with about 2-3 external spinules. Mid femora with about 8 external spinules. Hind femora with about 4 external spinules; terminal dorsal spine absent. Hind tibiae with about 45 external dorsal spinules. Venation of fore wings as in Text-fig. 57. Hind wings extending beyond fore wings by about quarter length of latter.

Tenth abdominal tergite emarginate posteriorly. Supra-anal plate triangular. Cerci as in Text-fig. 36, spatulate with dorsal and ventral ridge apically. Subgenital plate as in Text-figs. 9 and 26.

Coloration green, with brown markings on vertex, pronotal disc, and stridulatory organ. Apical ridges of cerci darkened.

♀ unknown.

#### MEASUREMENTS

##### *Male*

Total length : 31·7.

Median length of pronotum : 3·6.

Length of hind femur : 20·2.

Length of fore wing : 21·9.

DISCUSSION. This species may be recognized by the male genitalia.

#### MATERIAL EXAMINED

The holotype is unique.

#### 8. *Ducetia crosskeyi* sp. n.

Holotype ♂, NIGERIA: Niger Province, Diko, in house, 9.xii.1958 (*Crosskey*). In the British Museum (Natural History).

DIAGNOSIS. ♂. Subgenital plate as in Text-figs. 10, 25 and 27, with two inwardly-directed apical teeth. Cerci as in Text-fig. 37. Venation of fore wings as in Text-fig. 58.

♀ unknown.

DESCRIPTION. ♂. Fastigium of vertex long, compressed, sulcate above.

Pronotum without lateral carinae; lateral lobes with well-developed humeral sinus. Fore coxae unarmed. Femora unarmed. Fore tibiae with about 5-7 external ventral spurs. Mid tibiae with about 10-11 external ventral spurs. Hind femora without terminal dorsal spine. Hind tibiae with about 60-70 external dorsal spines. Venation of fore wings as in Text-fig. 58. Hind wings extending beyond fore wings by just under third length of latter.

Tenth abdominal tergite much enlarged. Supra-anal plate small, rounded posteriorly. Cerci as in Text-fig. 37. Subgenital plate as in Text-figs. 10, 25, and 27, with two inwardly-directed apical teeth.

Coloration brown above, mainly green elsewhere. Legs largely brown, but often green basally. Fore wings (and, less often, exposed part of hind wings) usually with some dark brown spots. Cerci darkened towards tip.

♀ unknown.

#### MEASUREMENTS

##### *Males*

Total length (9) : 29·1–32·6, mean 30·70.

Median length of pronotum (10) : 3·3–3·6, mean 3·43.

Length of hind femur (9) : 18·4–20·9, mean 19·38.

Length of fore wing (10) : 20·1–22·0, mean 21·02.

**VARIATION.** The tibial spurs and spines vary a little in number. The arrangement of the radial branches in the fore wing is often irregular; when arranged in a normal pectinate fashion, they are usually four in number. There is considerable variation in the shape of the apical part of the cerci: it is three-edged in the holotype (and therefore triangular in cross-section) but is flat and two-edged in some of the other specimens. It is probable that this variation will prove to be of a geographical nature when more material becomes available.

**DISCUSSION.** This species may be easily diagnosed by the male genitalia. The subgenital plate has two inwardly-directed teeth of the type shown by *D. chinensis* (Brunner), but the two species differ widely in all other respects.

#### MATERIAL EXAMINED

♂ holotype; 1 ♂ paratype, NIGERIA: Niger Province, Diko, in house, 6.xii.1958 (*Crosskey*); 1 ♂ paratype, NIGERIA: Niger Province, Diko, 12–15.xii.1958 (*Crosskey*); 1 ♂ paratype, NIGERIA: Niger Province, Diko, nr. Abuja, at light, iv–x.1956 (*Crosskey*); 1 ♂ paratype, NIGERIA: Niger Province, Minna, at light, vii.1956 (*Crosskey*); 1 ♂ paratype, NIGERIA: Katsina Province, Kankiya, at light, x.1956 (*Crosskey*); 1 ♂ paratype, NIGERIA: Zaria Province, Kaduna, at light, viii.1955 (*Crosskey*); 1 ♂ paratype, NIGERIA: Ibadan, at light, vi.1956 (*Eastop*).

GHANA: Yeji, Volta R., at light, 15.xi.1926 (—) (1 ♂); FRENCH EQUATORIAL AFRICA: Ubangi, x.1910 (*Talbot*) (1 ♂).

All in the British Museum (Natural History).

DISTRIBUTION (Text-fig. 2). Doubtless widespread in West Africa.

#### 9. *Ducetia loosi* Griffini, 1908

*Ducetia loosi* Griffini, 1908, *Mém. Soc. ent. Belg.* 15: 204. Holotype ♀, BELGIAN CONGO: Popocabacca (*Loos*). In the Institut Royal des Sciences Naturelles de Belgique, Brussels.

**DIAGNOSIS.** ♂. Venation of fore wings as in Text-fig. 59, R with about 5 posterior branches. Subgenital plate as in Text-figs. 11 and 28. Cerci as in Text-fig. 38.

♀. Venation of fore wings as in Text-fig. 85.

## MEASUREMENTS

*Males*

Total length (11) : 45·8–49·8, mean 47·35.

Median length of pronotum (13) : 4·4–4·9, mean 4·55.

Length of hind femur (9) : 26·3–30·7, mean 28·08.

Length of fore wing (13) : 32·5–34·9, mean 33·37.

*Females*

Total length (5) : 46·4–48·2, mean 47·54.

Median length of pronotum (11) : 4·3–4·9, mean 4·60.

Length of hind femur (9) : 24·7–28·6, mean 26·70.

Length of fore wing (7) : 32·2–34·8, mean 33·74.

Length of ovipositor (11) : 7·3–8·2, mean 7·62.

DISCUSSION. This species and *D. fuscopunctata* Chopard, which may be only sub-specifically distinct (see the discussion of *D. fuscopunctata* Chopard, p. 195), are the largest African members of the genus, having fore wings usually more than 30 mm. long. Males of *D. loosi* Griffini may be distinguished from this sex of *D. fuscopunctata* Chopard by the shape of the subgenital plate. Both species occur in two principal colour varieties, one of which is all brown, and the other green in the female and green with brown and orange dorsum in the male.

## MATERIAL EXAMINED

♀ holotype.

BELGIAN CONGO : Eala, 1935–36 (*Ghesquière*) (10 ♂, 3 ♀) (Mus. Congo Belge) ; Bambesa, 24.iii.1932 (*Vrydagh*) (1 ♀) (Mus. Congo Belge) ; Bambesa, 10.iv.1937 (*Vrydagh*) (1 ♀) (Mus. Congo Belge) ; Bafwarikubi, 12.ix.1912 (*Christy*) (1 ♂) (Mus. Congo Belge) ; Kunungu, Réc. Nkele, 1932 (*Schouteden*) (1 ♂) (Mus. Congo Belge) ; Tshuapa, Bokungu, 1949 (*Dupuis*) (1 ♂) (Mus. Congo Belge) ; Yambata, ii–iii.1914 (*De Giorgi*) (1 ♀) (Mus. Congo Belge) ; Urundi, Bitare, Kitega, 16–20.ii.1950 (*Laurent*) (1 ♀) (Mus. Congo Belge) ; Kwango, Kiniati-Yasa, 2.x.1952 (*Ruelle*) (1 ♀) (Mus. Congo Belge) ; Kivu, Masisi, 1938 (*Le Moult*) (3 ♀) (Zool. Inst. Lund) ; UGANDA : Tero Forest, vii.1912 (*Gowdey*) (1 ♂) (British Museum (Natural History)).

DISTRIBUTION (Text-fig. 2). *D. loosi* Griffini probably covers most of the more humid parts of Equatorial Africa.

10. *Ducetia fuscopunctata* Chopard, 1954

*Ducetia fuscopunctata* Chopard, 1954, La réserve naturelle intégrale du Mont Nimba. Fasc. II. Pt. III. Orthoptères Ensifères. *Mém. Inst. franç. Afr. noire*, 40 (2) : 35. Holotype ♂, GUINEA : Nimba, Yalanzou, ii–vi.1942 (*Lamotte*). In the Muséum National d'Histoire Naturelle, Paris.

DIAGNOSIS. ♂. Venation of fore wings as in Text-fig. 60, R with 4–5 posterior branches. Subgenital plate as in Text-figs. 12 and 29. Cerci as in Text-fig. 39.

♀. Venation of fore wings as in Text-fig. 86.



## MEASUREMENTS

*Males*

- Total length (7) : 44.3–50.4, mean 47.37.  
 Median length of pronotum (7) : 4.3–4.9, mean 4.62.  
 Length of hind femur (7) : 26.3–29.0, mean 27.71.  
 Length of fore wing (6) : 29.5–35.4, mean 32.82.

*Females*

- Total length (1) : 44.3.  
 Median length of pronotum (2) : 4.6–4.8, mean 4.70.  
 Length of hind femur (1) : 27.2.  
 Length of fore wing (2) : 30.7–33.0, mean 31.85.  
 Length of ovipositor (1) : 6.9.

DISCUSSION. It is probable that this species represents a western subspecies of *D. loosi* Griffini, which it resembles closely in all features except the shape of the apical part of the male subgenital plate. The male specimens from Ghana have a narrower stridulatory organ and a markedly swollen base to the media in the fore wings, when compared with the holotype and specimens from Sierra Leone, and it is probable that this will be best regarded as another subspecific distinction when more material is available. No specimens are as yet forthcoming from Nigeria, where it is very likely that this species also occurs; possibly such material would be intermediate between *D. fuscopunctata* Chopard and *D. loosi* Griffini in the shape of the male subgenital plate.

*D. fuscopunctata* Chopard shows the same two principal colour varieties as those found in *D. loosi* Griffini.

## MATERIAL EXAMINED

♂ holotype.

SIERRA LEONE : Njala, 27.vii.1928 (*Hargreaves*) (1 ♂); Njala, 17.xii.1930 (*Hargreaves*) (1 ♂); GUINEA : Nimba Mts., vi.1951 (*Holas*) (1 ♂) (Institut Français d'Afrique Noire, Dakar); Nimba Mts., Ziéla, ix.1956 (*Lamotte*) (1 ♀) (Institut Français d'Afrique Noire, Dakar); GHANA : Tafo, at light, v.1957 (*Eastop*) (2 ♂); Tafo, v–vi.1954 (*Williams*) (1 ♂); Aburi, 1912–13 (*Patterson*) (1 ♂); FRENCH WEST AFRICA : Togo, Misahöhe, v–vi.1894 (*Baumann*) (1 ♂, 1 ♀) (Zool. Mus. Berlin).

In the British Museum (Natural History) unless otherwise stated.

DISTRIBUTION (Text-fig. 2). This species is known only from French West Africa (including Guinea), Sierra Leone, and Ghana, but probably also occurs in Nigeria.

11. *Ducetia macrocerca* sp. n.

Holotype ♂, BELGIAN CONGO : Katanga, Kiambi, 20.ii.1911 (*Valdonio*). In the Musée Royal du Congo Belge, Tervuren.



DIAGNOSIS. ♂. Venation of fore wings as in Text-fig. 61, R with 3-4 posterior branches. Cerci long, shaped as in Text-fig. 40. Subgenital plate as in Text-fig. 13. ♀ unknown.

DESCRIPTION. ♂. Fastigium of vertex sloping steeply to frons, compressed, sulcate above.

Pronotum without lateral carinae; lateral lobes with moderately developed humeral sinus. Fore coxae unarmed. Fore femora with about 9 external spinules. Mid femora with about 15-18 external spinules. Hind femora with about 14 external ventral spinules; terminal dorsal spine absent. Hind tibiae with about 60-70 external dorsal spinules. Venation of fore wings as in Text-fig. 61, R with 3-4 posterior branches; cross-veins of area R arranged in closely parallel fashion from base of wing to first radial branch. Hind wings extending beyond fore wings by about third length of latter.

Tenth abdominal tergite enlarged, emarginate posteriorly. Supra-anal plate long, ligulate. Cerci long, shaped as in Text-fig. 40. Subgenital plate as in Text-fig. 13.

Coloration reddish above, mainly green elsewhere. Antennae, femora, and fore tibiae, partly reddish; mid and hind tibiae brown. Femoral spinules darkened. Tibial spines with dark tip. Fore wings and exposed part of hind wings with some dark brown spots. Cerci darkened towards tip.

♀ unknown.

#### MEASUREMENTS

##### *Male*

Total length : 39.5.

Median length of pronotum : 4.4.

Length of hind femur : 23.4.

Length of fore wing : 26.5.

DISCUSSION. The relatively long cerci, and the very elongate subgenital plate, with its slender lobes, enable the male of this species to be easily diagnosed.

#### MATERIAL EXAMINED

The holotype is unique.

#### 12. *Ducetia costata* sp. n.

Holotype ♂, BELGIAN CONGO: Nyangwe, iv-v.1918 (*Mayné*). In the Musée Royal du Congo Belge, Tervuren.

DIAGNOSIS. ♂. Venation of fore wings as in Text-fig. 62, R with 5 very prominent posterior branches. Cerci as in Text-fig. 41. Subgenital plate as in Text-fig. 14. ♀ unknown.

DESCRIPTION. ♂. Fastigium of vertex compressed, sulcate above.

Pronotum without lateral carinae. Fore coxae unarmed. Fore femora with about 2-3 external spinules. Mid femora with about 8 external spinules. Hind

femora unarmed or with about 1 or 2 ventral spinules ; terminal dorsal spine absent. Hind tibiae with about 40–50 external dorsal spines. Venation of fore wings as in Text-fig. 62, R with 5 very prominent posterior branches. Hind wings extending beyond fore wings by half length of latter.

Tenth abdominal tergite somewhat enlarged. Supra-anal plate longer than broad. Cerci as in Text-fig. 41. Subgenital plate as in Text-fig. 14.

Coloration probably green, with reddish markings on vertex, antennae, disc of pronotum, parts of legs, and stridulatory organ. Femoral spinules conspicuously black. Tibial spines with black tip. Cerci darkened towards tip.

♀ unknown.

#### MEASUREMENTS

##### *Male*

Total length : 29.6.

Median length of pronotum : 3.1.

Length of hind femur : 18.2.

Length of fore wing : 17.0.

DISCUSSION. The very proximal position of the first branch of the radius in the fore wing is found elsewhere in the genus only in *D. ramulosa* sp. n., which differs widely from the present species in the shape of the male cerci.

#### MATERIAL EXAMINED

The holotype is unique.

#### 13. *Ducetia chelocerca* sp. n.

Holotype ♂, SOUTH AFRICA : Transvaal, junction of Crocodile and Marico Rivers, ii. 1918 (*Tucker*). In the South African Museum, Cape Town.

DIAGNOSIS. ♂. Cerci as in Text-fig. 42. Subgenital plate as in Text-fig. 15. Venation of fore wings as in Text-fig. 63 ; R with 2–4 branches, often arranged in rather irregular fashion.

♀ unknown.

DESCRIPTION. ♂. Fastigium of vertex moderately compressed, sulcate above.

Pronotum without lateral carinae ; humeral sinus of lateral lobes indistinct or absent. Fore coxae unarmed. Fore femora with about 0–3 external spinules. Mid femora with about 7–9 external spinules. Hind femora with about 5–9 external spinules ; terminal dorsal spine absent. Hind tibiae with about 55–70 external dorsal spines. Venation of fore wings as in Text-fig. 63 ; R with 2–4 branches, often arranged in rather irregular fashion. Hind wings extending beyond fore wings by about fifth length of latter.

Tenth abdominal tergite somewhat enlarged. Supra-anal plate quadrate. Cerci as in Text-fig. 42. Subgenital plate as in Text-fig. 15.

Coloration green, with red-brown or brown markings on vertex, antennae, and stridulatory organ. Femoral spinules and tibial spines with dark tips. Cerci darkened at tip.

♀ unknown.

## MEASUREMENTS

*Males*

Total length (3) : 30.5–30.9, mean 30.63.

Median length of pronotum (3) : 3.2–3.4, mean 3.27.

Length of hind femur (2) : 21.8–22.1, mean 21.95.

Length of fore wing (3) : 21.7–22.4, mean 21.97.

VARIATION. The femoral spinules and tibial spines vary in number. The radial branches in the fore wing tend to be arranged irregularly; their number and position differed considerably in the three specimens examined.

DISCUSSION. This species may be easily recognized by the male genitalia. Together with *D. parva* sp. n., this species has a less deeply bilobed subgenital plate than any other African species of the genus.

## MATERIAL EXAMINED

♂ holotype; 2 ♂ paratypes, same data as holotype (1 in S.A. Mus. Cape Town; 1 in British Museum (Natural History)).

DISTRIBUTION. Known only from the type locality.

14. *Ducetia ramulosa* sp. n.

Holotype ♂, NORTHERN RHODESIA: Luano Valley, R. Mulungushi, 16–17.i.1928 (*Burr*). In the British Museum (Natural History).

DIAGNOSIS. ♂. Venation of fore wings as in Text-fig. 64, R usually with 6 prominent posterior branches. Cerci as in Text-fig. 43. Subgenital plate as in Text-fig. 16.

♀ unknown.

DESCRIPTION. ♂. Fastigium of vertex sloping steeply to frons, compressed, sulcate above.

Pronotum without lateral carinae; lateral lobes with distinct humeral sinus. Fore coxae unarmed. Fore femora with about 4–7 external spinules. Mid femora with about 9–10 external spinules. Hind femora unarmed or with about 1–2 ventral spinules; terminal dorsal spine absent. Hind tibiae with about 60 external dorsal spines. Venation of fore wings as in Text-fig. 64, R usually with 6 prominent posterior branches. Hind wings extending beyond fore wings by about half length of latter.

Tenth abdominal tergite enlarged. Supra-anal plate triangular. Cerci as in Text-fig. 43. Subgenital plate as in Text-fig. 16.

Coloration green, with red-brown markings, on vertex, antennae, pronotal disc, stridulatory organ, and posterior margin of fore wings. Sides of thorax, parts of legs, and abdominal tergites, with reddish spots. Femoral spinules black. Tibial spines with black tip. Fore wings with few brown spots. Cerci darkened at tip.

♀ unknown.

## MEASUREMENTS

*Males*

Total length (2) : 35·8–35·8, mean 35·80.

Median length of pronotum (2) : 3·4–3·5, mean 3·45.

Length of hind femur (2) : 20·0–21·6, mean 20·80.

Length of fore wing (2) : 21·5–21·7, mean 21·60.

VARIATION. From the two specimens available it is clear that the femoral spinules vary greatly in number. In the paratype the two most proximal branches of the radius in the right fore wing have a short common stem, so that strictly R has five posterior branches in this wing, the first one dividing again.

DISCUSSION. The radius of the fore wing of this species has more posterior branches than any other member of the genus, except for abnormal specimens of *D. japonica* (Thunberg).

## MATERIAL EXAMINED

♂ holotype ; 1 ♂ paratype, same data and depository as holotype.

DISTRIBUTION. Known only from the type locality.

15. *Ducetia sagitta* sp. n.

Holotype ♂, ANGOLA : Lepi, 390 km. from coast, 3,500 ft. (*Robins*). In the British Museum (Natural History).

DIAGNOSIS. ♂. Cerci as in Text-fig. 44. Subgenital plate as in Text-fig. 17. Venation of fore wings as in Text-fig. 65, R with 4–5 posterior branches.

♀ unknown.

DESCRIPTION. ♂. Fastigium of vertex moderately compressed, sulcate above.

Pronotum without lateral carinae ; humeral sinus of lateral lobes rather indistinct. Fore coxae unarmed. Fore femora with about 3–5 external spinules. Mid femora with about 8–13 external spinules. Hind femora with variable number of ventral spinules or unarmed ; terminal dorsal spine absent. Hind tibiae with about 45–60 external dorsal spines. Venation of fore wings as in Text-fig. 65, R with 4–5 posterior branches. Hind wings extending beyond fore wings by slightly more than third length of latter.

Tenth abdominal tergite enlarged, its posterior margin smoothly convex. Supra-anal plate simply ligulate or bilobed apically. Cerci as in Text-fig. 44. Subgenital plate as in Text-fig. 17.

General coloration green. Vertex and antennae with brown markings. Pronotum with dark spot on each side of anterior part of disc, in centre of disc, on humeral sinus, and sometimes elsewhere. Femoral spinules sometimes darkened. Tibiae sometimes brown. Tibial spines with dark tip. Stridulatory organ and posterior margin of fore wings more or less brown. Fore wings sometimes with dark spots. Cerci darkened at tip.

♀ unknown.



## MEASUREMENTS

*Males*

Total length (5) : 32.1-40.7, mean 36.36.

Median length of pronotum (5) : 3.4-4.4, mean 3.76.

Length of hind femur (5) : 19.6-24.2, mean 21.58.

Length of fore wing (4) : 22.4-25.7, mean 24.02.

VARIATION. The femoral spinules and tibial spines vary in number. In the two specimens from South West Africa the hind femora were quite unarmed, though these limbs bore 8-12 external ventral spinules in the three Angolan specimens. The shape of the supra-anal plate varies from being long and rather pointed apically (northern specimens) to being shorter and truncate or even bilobed (southern specimens). The cerci also vary in shape, and the material available suggests that this variation is again of a geographical nature. The brown components of the coloration were much more marked in the two most northerly specimens than in the remaining three.

DISCUSSION. This species is characterized by the shape of the male cerci.

## MATERIAL EXAMINED

♂ holotype; 1 ♂ paratype, ANGOLA : Huambo, viii.1934 (Pimentel) (British Museum (Natural History)).

ANGOLA : Namakunde, ii.1923 (—) (1 ♂) (S.A. Mus. Cape Town); SOUTH WEST AFRICA : Otjiverongo, iv.1951 (*Brown*) (1 ♂) (British Museum (Natural History)); Narebis, iii.1921 (*Barnard*) (1 ♂) (S.A. Mus. Cape Town).

DISTRIBUTION (Text-fig. 2). Known only from western Angola and South West Africa.

16. *Ducetia biramosa* (Karsch, 1888) comb. n.

*Paura biramosa* Karsch, 1888, *Berl. ent. Z.* 32 : 439. Holotype ♀, TANGANYIKA : Usambara, ii-iii, 1886 (*Schmidt*). In the Zoologisches Museum of the Humboldt-Universität, Berlin.

*Isotima biramosa* (Karsch), Brunner, 1891, *Additamenta zur Monographie der Phaneropteriden*, p. 54.

DIAGNOSIS. ♂. Cerci gradually tapering to slender point, as in Text-fig. 45. Venation of fore wings as in Text-fig. 66, R with 3-4 posterior branches. Subgenital plate as in Text-fig. 18.

♀. Hind wings rudimentary. Venation of fore wings as in Text-fig. 87. Ovipositor as in Text-fig. 73.

DESCRIPTION OF ♂. Fastigium of vertex compressed, sulcate above.

Pronotum without lateral carinae; lateral lobes with moderately developed humeral sinus. Fore coxae unarmed. Fore femora with about 1-3 external spinules. Mid femora with about 13-17 external spinules. Hind femora with about 9-13 external spinules; terminal dorsal spine absent. Hind tibiae with about 60-70 external dorsal spines. Venation of fore wings as in Text-fig. 66; R with



3-4 posterior branches, sometimes rather irregular in their arrangement. Hind wings extending beyond fore wings by between quarter and fifth length of latter.

Tenth abdominal tergite somewhat enlarged. Supra-anal plate triangular. Cerci gradually tapering to slender point, as in Text-fig. 45. Subgenital plate as in Text-fig. 18.

General coloration green. Fastigium of vertex brown above. Pronotum with dark brown spots on each side of anterior and posterior part of disc. Hind tibiae mostly or entirely brown. Femoral spinules, tibial spines, and cerci, with dark tip. Stridulatory organ with brown markings. Posterior margin of fore wings sometimes brown. Fore wings with few dark brown spots.

#### MEASUREMENTS

##### *Males*

- Total length (2) : 33.2-34.4, mean 33.80.  
 Median length of pronotum (2) : 3.7-3.9, mean 3.80.  
 Length of hind femur (2) : 23.4-24.4, mean 23.90.  
 Length of fore wing (2) : 24.0-24.4, mean 24.20.

##### *Females*

- Total length (2) : 25.1-29.1, mean 27.10.  
 Median length of pronotum (2) : 4.5-4.6, mean 4.55.  
 Length of hind femur (2) : 21.6-22.1, mean 21.85.  
 Length of fore wing (2) : 21.5-23.5, mean 22.50.  
 Length of ovipositor (2) : 7.5-7.8, mean 7.65.

DISCUSSION. This species, in common with *D. punctipennis* (Gerstaecker) (and probably most of the other East African species of the genus), shows marked sexual dimorphism. Until the present time, the female has been known as *Paura biramosa* Karsch, and its association with *Ducetia* Stål has been unsuspected (see p. 172). Careful comparison with the holotype and with the other female listed below leaves little doubt that the two males, which clearly belong to *Ducetia* Stål, are conspecific with them, and a description of the male sex is given above.

The male may be diagnosed by the genitalia, especially the shape of the cerci, and the fore wings, which are relatively broader than those of any of the other African members of the genus. The female may be distinguished from *D. punctipennis* (Gerstaecker) by its longer, more pointed, fore wings.

#### MATERIAL EXAMINED

♀ holotype.

TANGANYIKA : Dar-es-Salaam, iv.1924 (*Cutler*) (1 ♂) ; Morogoro, on cotton, v.1931 (*Agric. Dept. Ent. Lab.*) (1 ♂) ; Kilosa, 21.iii.1922 (*Loveridge*) (1 ♀).

All in the British Museum (Natural History).

DISTRIBUTION. Known only from eastern Tanganyika.

17. *Ducetia punctipennis* (Gerstaecker, 1869)

*Phaneroptera punctipennis* Gerstaecker, 1869, *Arch. Naturgesch.* 35 (1): 215. Holotype ♂, KENYA: Mt. Ndara, xii.1862 (*Kersten, on von der Decken's Exp.*). In the Zoologisches Museum of the Humboldt-Universität, Berlin.

*Paura reticulosa* Karsch, *Berl. ent. Z.* 32: 440. Holotype ♀, KENYA: Mombasa, xii.1876 (*Hildebrandt*). In the Zoologisches Museum of the Humboldt-Universität, Berlin. **Syn. n.**  
*Isotima reticulosa* (Karsch), Brunner, 1891, *Additamenta zur Monographie der Phaneropteriden*, p. 55.

*Telaea quadripunctata* Bolivar, 1922, *Voy. M. Rothschild E. Afr. Anim. Art.* 1: 201. Holotype ♂, KENYA: Simba. Lost. **Syn. n.**

DIAGNOSIS. ♂. Subgenital plate as in Text-fig. 19. Venation of fore wings as in Text-fig. 67, R with 3-6 posterior branches; right fore wing with small transparent patch in basal region of areas R and MA. Cerci as in Text-fig. 46.

♀. Hind wings rudimentary. Venation of fore wings as in Text-fig. 88. Ovipositor as in Text-fig. 74.

## MEASUREMENTS

*Males*

Total length (4): 29.8-35.2, mean 31.80.

Median length of pronotum (4): 3.2-3.5, mean 3.37.

Length of hind femur (4): 20.2-24.0, mean 22.30.

Length of fore wing (4): 20.0-22.7, mean 21.18.

*Females*

Total length (3): 23.0-24.2, mean 23.77.

Median length of pronotum (3): 4.1-4.8, mean 4.50.

Length of hind femur (2): 20.8-21.6, mean 21.20.

Length of fore wing (3): 18.6-19.6, mean 19.07.

Length of ovipositor (3): 6.3-6.8, mean 6.54.

DISCUSSION. The transparent patch at the base of the right fore wing and the shape of the subgenital plate enable males of this species to be easily recognized. The fore wings of this sex tend to be shinier and more translucent and to have fewer radial branches in the more northerly parts of the range. The small brown spots which are present on the fore wings of specimens from southern Kenya are less evident in more northerly specimens and were quite lacking in the specimen from Somalia (except for two small spots at the base of the radial area of the right fore wing). The cerci of the specimen from Somalia were stouter and much less attenuate than those of the more southerly specimens.

As a result of kind investigations made by Drs. L. Chopard and E. Morales Agacino, it seems that the holotype of *Telaea quadripunctata* Bolivar is neither in Paris nor Madrid, and must be presumed to be lost. However, it is abundantly clear from the original description that this name is a synonym of *D. punctipennis* (Gerstaecker); the type localities of the two holotypes are close together in southern Kenya.

The females of this species are strikingly different from the males. The hind wings are rudimentary and the fore wings bear no resemblance to those of the opposite sex. As in the Acrometopae (see Ragge, 1960, p. 275) this sexual dimorphism also affects the vertex, pronotum, and hind legs. As a result of these intersexual differences the females of this species and *D. biramosa* (Karsch), when first discovered (Karsch, 1888), were used as the basis of a new genus, *Paura* Karsch (and new group Paurae!), which was considered by this author to be related to the Acridopezae, Eurypalpa, and Leptoderae, though he noted that the fore femora were of the type found in the Ducetiae. Brunner (1891, p. 54) synonymized this genus with *Isotima* Brunner, but Kirby (1906, p. 407) gave it separate status again. (It should be noted that Kirby listed *Paura* Karsch twice in his Catalogue, first (p. 399) as a synonym of *Isotima* Brunner and second (p. 407) as an independent genus; the first of these entries was unintentional, as shown by the page reference to it in the index being in square brackets.) Since that time the taxonomic status of *Paura* Karsch has not been further investigated.

The fact that the female sex was unknown in almost all the East African species of *Ducetia* Stål suggested that these species might show an unusual degree of sexual dimorphism, and that the females might, as a result, have been placed in a different genus. The genus *Paura* Karsch, based on females only, was an obvious possibility, and a careful comparison of the holotypes of the two species of *Paura* Karsch with males of *Ducetia* Stål from similar parts of East Africa has enabled the two sexes of these two species to be brought together. The male of *Paura reticulosa* Karsch proved to have been previously described as the present species and this name therefore becomes a synonym. The holotype of *Paura biramosa* Karsch, which differs from the female of the present species in having longer, more pointed, fore wings, has been associated with two males and a female from Tanganyika; this specific name remains valid (see p. 172).

#### MATERIAL EXAMINED

♂ holotype. ♀ holotype of *Paura reticulosa* Karsch.

KENYA: Manderla distr., Takabba, 03° 25' N., 40° 12' E., thorn-bush, 13.xii.1944 (*Kevan*) (1 ♂); Moyale distr., Yasere, 03° 30' N., 38° 35' E., thorn-bush, 14.vi.1946 (*Kevan*) (1 ♂); Manderla distr., Damassa, 03° 09' N., 41° 20' E., desert grass and thorn-bush, 17.xii.1944 (*Kevan*) (1 ♂); SOMALIA: Lugh-Ferrandi, 11.xi.1953 (*Popov*) (1 ♂).

All in the British Museum (Natural History).

DISTRIBUTION (Text-fig. 2). This species is probably distributed over most of the semi-desert area of eastern Africa.

#### 18. *Ducetia punctata* (Schulthess, 1898) comb. n.

*Pseudisotima punctata* Schulthess, 1898, *Ann. Mus. Stor. nat. Genova*, 39: 199. Holotype ♀, ETHIOPIA: Girma, viii.1893 (*Ruspoli*). In the Museo Civico di Storia Naturale, Genoa.

DIAGNOSIS. ♂. Hind wings rudimentary. Fore wings much reduced, their venation as in Text-fig. 68. Cerci as in Text-fig. 47. Subgenital plate as in Text-fig. 20.

♀. Hind wings rudimentary. Fore wings reduced to short lobes, their venation as in Text-fig. 89. Ovipositor as in Text-fig. 75.

#### MEASUREMENTS

##### *Males*

Total length (2) : 13·2–14·7, mean 13·95.  
 Median length of pronotum (2) : 3·3–3·8, mean 3·55.  
 Length of hind femur (1) : 17·8.  
 Length of fore wing (2) : 9·2–9·8, mean 9·50.

##### *Female*

Total length (to tip of fore wings) : 12·1.  
 Median length of pronotum : 4·0.  
 Length of hind femur : 19·0.  
 Length of fore wing : 6·7.  
 Length of ovipositor : 6·6.

DISCUSSION. This species has clearly been derived from *D. punctipennis* (Gerstaecker) by reduction of the wings, in much the same way as *D. javanica* (Brunner) has from *D. japonica* (Thunberg). The two species (*punctata* and *punctipennis*) are closely similar in most of their features, and, in spite of the wing-reduction, *D. punctata* (Schulthess) shows the same development of a transparent patch in the basal region of MA in the right male fore wing as is shown by *D. punctipennis* (Gerstaecker). The five dark spots on the disc of the pronotum are also common to the two species.

#### MATERIAL EXAMINED

KENYA: Moyale, open bush, 15.vi.1946 (*Kevan*) (2 ♂, 1 ♀) (British Museum (Natural History)).

DISTRIBUTION. Known only from the vicinity of the north-east frontier of Kenya.

#### 19. *Ducetia vitriala* sp. n.

Holotype ♂, BRITISH SOMALILAND: Haud, 8° 28' N., 45° 38' E., 2,500 ft., night, 22.v.1932 (*Taylor*). In the British Museum (Natural History).

DIAGNOSIS. ♂. Fore wings transparent and shiny, their venation as in Text-fig. 69; R with 2–4 posterior branches. Subgenital plate as in Text-fig. 21. Cerci as in Text-fig. 48.

♀ unknown.

DESCRIPTION. ♂. Fastigium of vertex moderately compressed, sulcate above. Pronotum without lateral carinae; humeral sinus poorly developed or absent. Fore coxae unarmed. Fore femora with about 4–7 external spinules. Mid femora with about 8–13 external spinules. Hind femora with about 11–15 external spinules; terminal dorsal spine absent. Hind tibiae with about 35–70 external dorsal spines.



Fore wings transparent and shiny, their venation as in Text-fig. 69; R with 2-4 posterior branches, occasionally rather irregular in their arrangement. Hind wings extending beyond fore wings by between half and third length of latter.

Tenth abdominal tergite somewhat enlarged. Supra-anal plate more or less triangular. Cerci as in Text-fig. 48. Subgenital plate as in Text-fig. 21.

General coloration green. Fastigium of vertex (and sometimes other parts of head) marked with red-brown or brown. Antennae mostly red-brown, brown, or dark brown (basal two segments largely green). Dorsal part of posterior margin of pronotum dark brown or black. Femoral spinules black. Tibial spines brown or black. Stridulatory organ brownish. Wings sometimes suffused with brown, and knees of all three pairs of legs sometimes brown. Cerci with dark tip.

♀ unknown.

#### MEASUREMENTS

##### *Males*

Total length (11): 32.5-38.3, mean 34.86.

Median length of pronotum (12): 2.8-4.2, mean 3.47.

Length of hind femur (13): 18.0-25.4, mean 21.35.

Length of fore wing (12): 20.7-24.3, mean 22.18.

VARIATION. The femoral spinules vary in number and there is great variation in the number of tibial spines. The coloration varies somewhat, especially in the extent of the brown component. The specimen from Lugh Ferrandi was the only one in which the wings and knees were suffused with brown.

DISCUSSION. The high degree of transparency shown by the fore wings of this species is found elsewhere in the genus only in *D. parva* sp. n., which is very much smaller. The shape of the male subgenital plate is also characteristic.

#### MATERIAL EXAMINED

♂ holotype; 10 ♂ paratypes, same data as holotype.

ETHIOPIA: Gherlogubi, I. xi. 1953 (*Bellehu*) (1 ♂); SOMALIA: Lugh Ferrandi, II. xi. 1953 (*Popov*) (1 ♂).

All in the British Museum (Natural History).

DISTRIBUTION. *D. vitriala* sp. n. probably occurs over a large part of the semi-desert area of eastern Africa.

#### 20. *Ducetia parva* sp. n.

Holotype ♂, BRITISH SOMALILAND: Haud, 8° 28' N., 45° 38' E., 2,500 ft., night, 23. v. 1932 (*Taylor*). In the British Museum (Natural History).

DIAGNOSIS. ♂. Small, total length less than 25 mm. Fore wings transparent and shiny, their venation as in Text-fig. 70; R with 3-4 posterior branches. Subgenital plate as in Text-fig. 22. Cerci as in Text-fig. 49.

♀ unknown.

DESCRIPTION. ♂. Fastigium of vertex compressed, sulcate above.

Pronotum without lateral carinae ; humeral sinus rather poorly developed. Fore coxae unarmed. Fore femora with about 1 or 2 external spinules. Mid femora with about 10 external spinules. Hind femora with several very small external spinules ; terminal dorsal spine absent. Hind tibiae with about 65 external dorsal spines. Fore wings transparent and shiny, their venation as in Text-fig. 70 ; R with 3-4 posterior branches. Hind wings extending beyond fore wings by about quarter length of latter.

Tenth abdominal tergite unmodified or perhaps very slightly enlarged. Supra-anal plate large, quadrate. Cerci as in Text-fig. 49. Subgenital plate as in Text-fig. 22.

General coloration green. Vertex with red-brown on fastigium and dark brown stripe behind each eye. Antennae red-brown except for basal two segments, which are largely green. Femoral spinules dark-tipped. Stridulatory organ brownish.

♀ unknown.

#### MEASUREMENTS

##### *Male*

Total length : 23.6.

Median length of pronotum : 2.6.

Length of hind femur : 15.0.

Length of fore wing : 16.7.

DISCUSSION. This is the smallest known fully-winged species of *Ducetia* Stål. It has the general appearance of a small version of *D. vitriala* sp. n., from which, however, it differs in the shape of the subgenital plate.

#### MATERIAL EXAMINED

The holotype is unique.

##### *NOIA* Walker, 1870

*Noia* Walker, 1870, Catalogue of Dermaptera Saltatoria, p. 476. Type species, by monotypy, *Noia testacea* Walker, 1870.

*Isotima* Brunner, 1878, Monographie der Phaneropteriden, p. 112. Type species, by subsequent designation (Kirby, 1906, p. 399), *Isotima rufomarginata* Brunner, 1878. **Syn. n.**

*Isotimula* Uvarov, 1940, *Ann. Mag. nat. Hist.* (11) 5 : 175. Nom. n. for *Isotima* Brunner, 1878 (nec Foerster, 1868). **Syn. n.**

DIAGNOSIS. ♂♀. Hind wings rudimentary. Media of male fore wing dividing very near wing-base, as in Text-fig. 71. Pronotum without lateral carinae ; lateral lobes with distinct angle in antero-ventral region of margin. Fastigium of vertex compressed, sulcate above. Fore tibiae with oval tympanic opening on both sides. Fore coxal spine absent.

DISCUSSION. The only character mentioned in the diagnosis above that enables *Noia* Walker to be separated from *Ducetia* Stål is the very proximal bifurcation of the media in the male fore wing. This feature is not shown by the female and is certainly not a good basis for a generic separation. As discussed on p. 172, *Noia* Walker is given separate status in this revision mainly for reasons of convenience.

The synonymy of *Isotima rufomarginata* Brunner with *Noia testacea* Walker, which results in the synonymy of *Isotima* Brunner and *Isotimula* Uvarov with *Noia* Walker, is mentioned below.

DISTRIBUTION. Known only from India.

### *Noia testacea* Walker, 1870

*Noia testacea* Walker, 1870, Catalogue of Dermaptera Saltatoria, p. 476. Holotype ♀, N. INDIA ("Hindustan"). In the British Museum (Natural History).

*Isotima rufomarginata* Brunner, 1878, Mohographie der Phaneropteriden, p. 113. Holotype ♂, INDIA: Himalaya (Hügel). In the Naturhistorisches Museum, Vienna. *Syn. n.*

DIAGNOSIS. ♂. Venation of fore wings as in Text-fig. 71. Cerci as in Text-fig. 50. Subgenital plate as in Text-fig. 23.

♀. Venation of fore wings as in Text-fig. 90. Ovipositor as in Text-fig. 76.

#### MEASUREMENTS

##### *Male*

Total length : 26.9.

Median length of pronotum : 4.6.

Length of hind femur : 21.5.

Length of fore wing : 22.1.

##### *Female*

Total length (to tip of fore wings) : 32.7.

Median length of pronotum : 6.1.

Length of hind femur : unmeasurable.

Length of fore wing : 25.9.

Length of ovipositor : 11.4.

DISCUSSION. The affinities of this species are rather obscure. Although regarded as representing a distinct genus by both Walker and Brunner, there are no taxonomic characters which enable this species to be separated from *Ducetia* Stål. Brunner regarded the form and venation of the fore wings as being of generic value, but there are two other brachypterous species of *Ducetia* Stål (*D. javanica* (Brunner) and *D. punctata* (Schulthess)), and the radius may have lost its pectinate branches as a result of the brachypterism. The shape of the pronotum and fore tibiae, and the male genitalia, are all typical of *Ducetia* Stål.

It is impossible to be quite certain that the male holotype of *Isotima rufomarginata* Brunner is conspecific with the female holotype of the present species, but the resemblance is so close that I have no hesitation in regarding it as such.

#### MATERIAL EXAMINED

♀ holotype. ♂ holotype of *Isotima rufomarginata* Brunner.

DISTRIBUTION. Known only from India. The type locality of *Isotima rufomarginata* Brunner suggests the possibility that the species is an alpine one.

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